File No: NA/147

Date: 2 March 1994

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

ADX 221

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

ADX 221

1. APPLICANT(S)

BP Chemicals (Additives) Australia Pty Ltd of 109 Union Road, Surrey Hills, Victoria 3127.

2. IDENTITY OF THE CHEMICAL

Based on the nature of the chemical and the data provided, ADX 221 is not considered to be hazardous. Therefore, the details of chemical name, other name, structural formula, spectral data, weight percentage and ingredients, number-average molecular weight, residual monomers/other reactants and low molecular weight species have been exempted from publication in the Full Public Report.

Trade name: ADX 221 (product containing the polymer

Molecular formula: Not known

Number Average Molecular Weight: >1000

Method of detection and determination:

The polymer can be separated by gel permeation chromatography and identified by infrared spectroscopy.

3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer in the form of the product ADX 221 will be imported in 21.8% mineral oil. The physical and chemical properties listed below are based on this product.

Appearance at 20°C and 101.3 kPa: Dark brown viscous liquid

Odour: Hydrocarbon

Glass-transition Temperature: Not determined

Specific Gravity/Density: 930 kg/m^3

Vapour Pressure: Not determined

Water Solubility: < 1 x 10^{-3} g/L at 20°C

Partition Co-efficient (n-octanol/water) log $P_{O/W}$: Not applicable

Hydrolysis as a function of pH: Not determined

Adsorption/Desorption: Not determined

Dissociation Constant pKa: Not applicable

Flash Point: > 150°C

Flammability Limits: Not determined

Combustion Products: Not determined

Pyrolysis Products: Not determined

Decomposition Temperature: Not determined

Decomposition Products: Not determined

Autoignition Temperature: > 300°C

Explosive Properties: Non-explosive

Reactivity: Non-reactive, it is stable at operating temperature of 300°C

Particle size distribution: Not applicable

The following comments on physico-chemical properties has been provided by the notifier:

Water solubility has not been determined but will be very low based on the molecular weight and structure of the polymer and diluent oil. The maximum water solubility for the product is estimated to be less than 0.1% in water.

Hydrolysis has not been determined. The polymer should not readily hydrolyse under environmental conditions.

Partition coefficient is only provided for pure, water soluble chemicals. Oily substances such as ADX 221 would be expected to partition into the hydrophobic compartment.

Adsorption/desorption has not been determined, but should be similar to other oily substances.

Dissociation constant has not been determined. This polymer should have a very low dissociation constant based on the chemical functionality. Also, dissociation would be hard to measure in view of the low water solubility.

4. PURITY OF THE CHEMICAL

Degree of purity : 88%

Adjuvants (s): none

5. INDUSTRIAL USE

The notified polymer is an additive for crankcase oils used in gasoline motor vehicles and light-duty diesel engines. The product containing the notified polymer will comprise up to 50% of crankcase oil additive, which will be further diluted to 5% in the marketed lubricant.

The projected imported volume of the notified polymer is 6.62-66.2 tonnes per annum in the first two years and 66.2-662 tonnes per annum in the following three years.

6. OCCUPATIONAL EXPOSURE

The notified polymer is shipped in bulk liquid tank containers in approximately 20 tonne parcels or in chemical parcel tankers approximately in 150 to 400 tonne lots.

In Australia the notified polymer will be supplied to approximately 25 locations for storage and warehousing prior to distribution for blending motor oils. Distribution of additive packages containing the polymer will be by road and rail. The notified polymer has been used in several European countries for approximately 12 months.

Two blenders, two laboratory technicians and a small number of storemen and transport personnel will be exposed to the notified polymer, at the Melbourne blending plant. Those handling additive packages containing ADX 221 at major oil blending installations will also be exposed to the notified polymer.

If leaks or spills occur exposure to the notified polymer is possible as part of the following activities:

. decanting drums or transfer from bulk iso tanks to storage vessels or blending kettles; and

. transfer from blend kettles to bulk road tankers or drums.

7. PUBLIC EXPOSURE

There is negligible potential for public exposure to ADX 221 during blending operations, which will be performed in bunded areas. Any spilled material is to be disposed of by incineration or landfill.

However, members of the public who undertake their own vehicle maintenance may become dermally exposed to the notified polymer when using and/or disposing of oils containing ADX 221, or handling engine components. A moderate level of exposure may be anticipated in persons who perform frequent maintenance tasks.

8. ENVIRONMENTAL EXPOSURE

. Release

The imported drums and parcels of the notified polymer in the additive packages are stored at warehouses and storage locations operated by transport companies and chemical storage companies largely in the major capital city environs.

Waste streams containing the notified polymer are confined to slops, washings and spills and contained within bunded areas for adequate treatment or disposal to prevent entry into sewers and waterways.

In product transfer and the lube oil blending process it is estimated that 20 kg per annum product loss of the notified polymer may be experienced under normal operations. These liquid releases are contained and controlled in appropriate compounds or pits for treatment or disposal.

The polymer may also be released to the environment through exhaust emissions, leakage and disposal of used oil.

It should be noted that oil emissions with the exhaust are very low (1) and the level of unoxidised polymer is likely to be higher from oil leakage from crankcase lubricated engines and the disposal of used oil.

Oil leaks have a tendency to accumulate in the environment, resulting in a significant environmental load (1). One-third of the lubricating oil sold is lost during use; some is lost on the pavement surface, in the streets, roads and in car parks. The oil remains on these surfaces until stormwater or the municipal services wash the oil off, when it is transported by stormwater drains to waterways or the ocean of urban zones, or to adjacent soils from roads in non-urban areas (2).

The losses of the polymer during motor oil changes would not be expected to be any different than losses experienced with other motor oils. Used lubricant handling guidelines stress minimising personal contact and disposal in an environmentally acceptable manner. However, it should be noted a report on used lubricating oil in Australia (3) indicates that lubricating oil not collected for recycling or reuse on site as a fuel or lubricant amounts to

22% of total sales. The methods of disposal of used oil includes dust and vegetation control, and dumping in sewers and landfill.

Fate

The notifier has stated that waste polymer from the blending process is prevented from entry into sewers and waterways.

The notified polymer will enter the environment when waste polymer from the blending process is disposed of by land fill or incineration. When the polymer is land filled it is likely to remain at the site of deposition. Leaching of the polymer is unlikely due to its large molecular weight, expected low water solubility and likely adsorption to soil. Incineration of the polymer is unlikely to produce toxic compounds.

The amount of polymer released to the environment through the exhaust emissions is likely to be low as the chemical is oxidised during combustion and any emissions can be expected to become associated with the soil compartment (including sediment).

Any unoxidised polymer which enters the environment from engine oil leakage and is lost on the pavement surface, in the streets, roads and in car parks is washed off (by rain or the municipal services) and is transported by storm water drains in the case of urban zones to waterbodies and become associated with the sediment. When the polymer is washed off roads to adjacent soils, it is likely to accumulate at the site of deposition unless erosion events transport it to water bodies where it is likely to become associated with the sediment.

The amount of unoxidised polymer in used oil is unclear. However, the potential exists for a significant portion of oil containing the polymer to be disposed of in an environmentally unacceptable manner (eg dust and vegetation control, and dumping in sewers and landfill). Any unoxidised polymer in used oil that is used for dust and vegetation control is likely to remain at the site of application until erosion events transport the polymer to waterbodies, where the polymer is likely to become associated with the sediment. The polymer is unlikely to leach when it is dumped at landfills. The dumping of the polymer in sewers is likely to result in the polymer becoming associated with sludge during treatment.

. Hydrolysis

No data is available but the polymer contains a number of succinimide and amide groups which may be susceptible to hydrolysis. However, it is unlikely that the polymer would be readily degraded by hydrolysis under environmental conditions because of limited solubility.

. Biodegradation

No information has been provided by the company. But because of its constituents the polymer is unlikely to be readily biodegraded under environmental conditions.

. Bioaccumulation

The high molecular weight of the polymer (NAMW >1000) indicates it is unlikely to bioaccumulate.

9. EVALUATION OF TOXICOLOGICAL DATA

9.1 Acute Toxicity

No toxicology data are required under the *Industrial Chemicals (Notification and Assessment) Act 1989* for polymers > 1000 molecular weight. However, the following studies, carried out on product OLOA 373C containing mineral oil and a succinimide linked polymer similar to the notified polymer, were submitted and are evaluated below.

Table 1 Summary of the acute toxicity of OLOA 373C

Test	Species	Outcome	Reference
Skin irritation	rabbit	slight irritant	(4)
Eye irritation	rabbit	slight irritant	(6)
Skin sensitisation	guinea pig	non-sensitising	(8)

9.1.1 Skin Irritation (4)

OLOA 373C was administered by occlusive application to the intact and abraded skin of four New Zealand White rabbits for 24 hours. The site of application was examined 24 and 72 hours after application. Skin reactions were assessed according to Draize (5).

At 24 hours there was erythema and slight oedema of the skin of all treated areas. At 72 hours the swelling had resolved and erythema had decreased in 3 of the 4 animals.

The results of this study indicate that OLOA 373C is a slight skin irritant.

9.1.2 Eye Irritation (6)

Three male New Zealand White rabbits were used in the study. Initially, a single dose of 0.1 ml OLOA 373C was instilled into the conjunctival sac of the right eye of the rabbits. After 4 seconds, tested eyes were rinsed with 150 ml lukewarm water. Ocular reactions were assessed according to Draize (7) 1, 23, 48, 72, 96 hours and 7 days post-exposure. The test was repeated without rinsing.

In the rinsed eyes, mild erythema and swelling of the conjunctivae with some discharge was noted one hour after treatment. In two of the three animals, mild erythema persisted up to 24 hours and had regressed by 48 hours.

In the unrinsed eyes, the degree of erythema at one hour was more severe with slight swelling in two animals, which persisted at 24 hours as slight erythema and swelling and had regressed by 48 hours.

The results of this study indicate that OLOA 373C is a slight eye irritant in rabbits at the concentration tested.

9.1.3 Skin Sensitisation (8)

The Magnusson-Kligman (9) test was used. Guinea pigs were challenged with 3, 1, 0.5 and 0.1% v/v OLOA 373C in liquid paraffin. Challenges elicited scattered reactions in one or two of the guinea pigs at all concentrations in the control group but at only 1% concentration in the test animals.

In view of the pattern of response these reactions were considered unlikely to be allergenic in origin or considered to have a weak allergenic potential.

The results of this study indicate that OLOA 373C is unlikely to be a skin sensitiser in guinea pigs at the concentrations tested.

9.2 Repeated Dose Toxicity (10)

A dose of 3000 mg/kg/day of OLOA 373C was administered by gavage in maize oil (4 ml/kg) to 6 Charles River rats (3/sex) for 10 days. The control group received only maize oil. At the end of the 10th day, animals were killed. No deaths, clinical signs or body weight effects were noted during the study and no gross changes were observed at necropsy as compared with the maize oil-treated controls.

No histopathological abnormalities were observed in the kidney, liver thymus or stomach.

9.3 Overall Assessment of Toxicological Data

It is a slight skin and a slight eye irritant but not a skin sensitiser. A 10-day repeated study showed no treatment-related effects at doses of 3000 mg/kg/day.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

Since the chemical being notified is a polymer of greater than 1000 molecular weight, environmental effects information is not required.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

Although up to 20 kg of polymer per annum may be lost from the blending process, the hazard presented to the environment is likely to be low, due to the release being spread over a number of sites across Australia, and the notifier states that waste is prevented from entering sewers and waterways. The disposal of the waste polymer from the blending process by land fill or incineration is unlikely to present a hazard to the environment.

Emissions during engine use are unlikely to present a hazard to the environment as the amount of intact polymer being lost is likely to be very low due to the oxidation of the polymer during combustion.

The hazard to the environment from the leaking of oil from engines and the disposal of used oil containing the polymer in an environmentally unacceptable manner (eg dust and vegetation control, and dumping in sewers and landfills) is likely to be low because:

The release will be dispersed across Australia (predominantly in the urban regions) and the environmental concentration of the polymer should be very low (below 1 ppb);

The bulk of this release is likely to become associated with soil/sediment;

The toxicity of such modified polyisobutylene polymers is low because of low bioavailability; and

Where the polymer is contained in urban and rural runoff and enters aquatic environments, the expected very low concentration of the polymer and its high molecular weight (NAMW >1000) indicates it is unlikely to present a hazard to organisms inhabiting these environments.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

There is no information on the effects of the notified polymer on human health. Based on the results of animal studies on a similar polymer (OLOA 373C), the notified polymer may be an eye and skin irritant. However, the skin and eye irritation may have resulted from the presence of mineral oil in OLOA 373C.

The notified polymer is non flammable, non explosive and stable. Under normal use conditions it will not pose a flammable, explosive, or a reactive hazard as a component in crankcase oil.

The level of residual monomers in the notified polymer is relatively high. Therefore exposure to the polymer should be minimised.

The most likely routes of exposure are skin and eye contact during the use of the polymer. Under normal use conditions and correct handling procedures, the potential for occupational exposure to the notified polymer appears to be low and is not expected to pose a significant health and safety risk to humans.

There is potential for public exposure to ADX 221 in finished engine oils containing the notified polymer. A moderate level of dermal exposure is anticipated among individuals who frequently undertake their own vehicle maintenance.

13. RECOMMENDATIONS

To minimise occupational exposure to the notified polymer in ADX 221 the following guide-lines and precautions should be observed:

. if engineering controls and work practices are insufficient to reduce exposure to a safe level, the following personal protective equipment which comply with Australian Standards should be worn. Overalls (AS 3765.1-1990 (11), (AS 3765.2-1990 (12), if handling in open vessels splash proof goggles (AS 1336-1982 (13), AS 1337-1984 (14)), during coupling and uncoupling hoses PVC gloves (AS 2161-1978) (15));

. good work practices should be implemented to avoid spills;

. clean up spills promptly; and

. a copy of the Material Safety Data Sheet (MSDS) should be easily accessible to all employees.

14. MATERIAL SAFETY DATA SHEET

The Material Safety Data Sheet (MSDS) for ADX 221 was provided in Worksafe Australia format (16). This MSDS was provided by BP Chemicals (Additives) Australia Pty Ltd 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 BP Chemicals (Additives) Australia Pty Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989* (the Act), secondary notification of ADX 221 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

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6. Wickham Research Laboratories Ltd. Test Reports L81BP040 and L81BP051.

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10 Life Science Research. Test Report 81/BP 0002/255, 8 June 1981.

11. Australian Standard 3765.1-1990, "Clothing for Protection Against Hazardous Chemicals, Part 1: Protection Against General or Specific Chemicals", Standards Association of Australia Publ., Sydney, 1990.

12. Australian Standard 3765.2-1990, "Clothing for Protection Against Hazardous Chemicals, Part 2: Limited Protection Against Specific Chemicals", Standards Association of Australia Publ., Sydney, 1990.

13. Australian Standard 1336-1982, "Recommended Practices for Eye Protection in the Industrial Environment", Standards Association of Australia Publ., Sydney, 1982

14. Australian Standard 1337-1984, "Eye Protectors for Industrial Applications", Standards Association of Australia Publ., Sydney, 1990.

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

16. National Occupational Health and Safety Commission, *Guidance Note for the Completion of a Material Safety Data Sheet*, 2nd. edition, AGPS, Canberra, 1990.