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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

BYK-LP N 6482 - POLYMER IN DISPERBYK 190

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 Worksafe Australia which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Department of the Environment, Sport, and Territories 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**BYK-LP N 6482 - POLYMER IN DISPERBYK 190****1. APPLICANT**

A C Hatrick Chemicals Pty Ltd of 49-61 Stephen Road BOTANY NSW 2019 has submitted a limited notification statement for an assessment certificate for BYK-LP N 6482 - Polymer in Disperbyk 190.

2. IDENTITY OF THE CHEMICAL

Trade name: BYK-LP N 6482

Number-average molecular weight: > 1 000

Maximum percentage of low molecular weight species

molecular weight < 1000: 0.2%
molecular weight < 500: 0.0%

Method of detection and determination: Gel Permeation Chromatography and infrared spectroscopy

3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer is a light yellow paste at ambient temperature and pressure with a specific gravity of 1.08, vapour pressure of less than 1 millibar, flash point above 100°C and a decomposition temperature above 200°C. The polymer is water soluble, does not form flammable vapours and does not explode.

Comments on Physico-Chemical Properties

The notifier claims that the notified polymer is soluble, though evidence or a test report has not been supplied. Water solubility is possible due to two different types of groups, though this could be offset by a significant hydrophobic fraction.

Hydrolysis of certain functionalities is possible but unlikely in the expected environmental pH range and temperature. The rest of the polymer is not expected to hydrolyse.

The partition coefficient is expected to be low to moderate due to the polymer's water solubility. It is unclear whether the polymer will sorb strongly to soils.

Dissociation is expected to be typical of that of carboxylic acids.

4. PURITY OF THE CHEMICAL

Degree of purity: 99.5%

Toxic or hazardous impurities: none

Non-hazardous impurities (> 1% by weight): none

Maximum content of residual monomers: 0.5%

Additives/Adjuvants: none

5. USE, VOLUME AND FORMULATION

The notified polymer is intended to be used as a dispersant in printing ink. It will be imported in cartridges for use in ink-jet printers. The maximum concentration of the notified chemical in the ink is 0.2%. The ink is expected to contain polyethylene glycol (maximum concentration 12%), diethylene glycol (maximum concentration 12%), N-methyl pyrrolidone (4%), isopropanol (4%), aminomethyl propanol (0.3%) and ammonia (0.05%). The total import volume will be 250 kg in the first year rising to 1 000 kg by the fifth year.

6. OCCUPATIONAL EXPOSURE

The notified polymer will be imported as part of a printing ink formulation in ink-jet cartridges (10-25 mL capacity) in multi-wall paper bags. Exposure to the polymer may occur rarely during transport or handling as a result of an accident.

For ink-jet cartridges exposure is possible during cartridge replacement or machine maintenance from leakage but is expected to be minimal.

7. PUBLIC EXPOSURE

There is negligible potential for public exposure during the importation and distribution of printing ink products. There may be widespread public contact with the notified chemical on the surface of printed paper, but its adhesion to the substrate suggests that casual contact is unlikely to lead to even minor dermal

exposure.

8. ENVIRONMENTAL EXPOSURE

Release

Releases to the environment may occur through processing of waste paper. This possibility is explored further below.

Releases to the environment as a result of accidents (during transport or in the workplace) are expected to be negligible.

The notified polymer is imported as a component of an inkjet printing ink contained within a cartridge (10-25 mL). It is expected that when the printer requires a new cartridge, the operator removes the spent cartridge and replaces it with a new one. Therefore, release of the notified polymer under normal conditions of use is expected to be negligible, as practically no waste is generated. Residues of the ink remaining in spent cartridges are claimed by the notifier as being minute. The notifier claims that the spent cartridges will be disposed of to approved landfill. It is believed that if the cartridges are used by home and office users, a likely disposal route is through domestic waste collection.

Fate

Unless incinerated, the polymer is likely to arrive in a dispersed manner in landfill bound to waste paper. As such, it will be immobile, and no leaching from landfill would be expected despite the polymer's expected persistence.

Paper containing the dried ink may be sent for recycling. Paper recycling is a growing industry in Australia. Wastepaper is repulped using a variety of alkalis, dispersing agents, wetting agents, water emulsifiable organic solvents and bleaching agents. These chemicals enhance fibre separation, ink detachment from the fibres, pulp brightness and whiteness of the paper. After pulping, the contaminants and the ink are separated from the fibres by pumping the stock through various heat washing, screening, cleaning, flotation and dispersion stages. The notifier has provided no data on the likely behaviour of the polymer during the recycling process. The polymer is likely to survive the above conditions, either remaining bound to the pulp or becoming associated with the sludge. In the former case, the polymer will either arrive in landfill or be destroyed through incineration.

Disposal of the notified polymer to landfill is unlikely to result in contamination of surface and ground waters. The expected low water solubility of the dry ink, and the high molecular weight and large molecular size of the polymer indicate it is unlikely to leach. Combustion of the notified polymer in presence of excess air will result in products of oxides of carbon and nitrogen, and water.

Bioaccumulation of the polymer is not expected as biological membranes are not permeable to polymers of very large molecular size (1,2).

9. EVALUATION OF TOXICOLOGICAL DATA

9.1 Acute Toxicity

Summary of the acute toxicity of BYK-LP N 6482

Test	Species	Outcome	Reference
acute oral toxicity	rat	LD ₅₀ > 8 000 mg/kg	3
skin irritation	rabbit	non-irritant	4
eye irritation	rabbit	slight irritant	5

9.1.1 Oral Toxicity (3)

<i>Species/strain:</i>	rat/ Wistar
<i>Number/sex of animals:</i>	3 males, 3 females
<i>Observation period:</i>	14 days
<i>Method of administration:</i>	gavage/ aqueous solution
<i>Clinical observations:</i>	none
<i>Mortality:</i>	none
<i>Morphological findings:</i>	none
<i>Test method:</i>	OECD Guidelines (6)
<i>LD₅₀:</i>	> 8 000 mg/kg
<i>Result:</i>	the notified polymer was of low acute oral toxicity in rats

9.1.2 Skin Irritation (4)

<i>Species/strain:</i>	rabbit/ New Zealand White
<i>Number/sex of animals:</i>	3
<i>Observation period:</i>	7 days
<i>Method of administration:</i>	4 hour treatment with neat substance; semi-occlusive gauze patch
<i>Test method:</i>	OECD Guidelines (6)

Result: no erythema or oedema was observed any animal up to 7 days after patch removal; the notified polymer was non-irritant to rabbit skin

9.1.3 Eye Irritation (5)

Species/strain: rabbit/ New Zealand White

Number/sex of animals: 3

Observation period: 7 days

Method of administration: 0.1 mL of neat substance in the conjunctival sac of the left eye

Test method: OECD Guidelines (6)

Result: slight conjunctival redness in all animals up to 8 hours post-treatment; slight chemosis in 2 animals up to 4 hours and 1 animal up to 2 hours post-treatment; slight discharge in one animal up to 8 hours and 2 animals up to 4 hours post-treatment; no other significant effects; the notified polymer was a slight eye irritant in rabbits

9.4 Overall Assessment of Toxicological Data

The notified polymer exhibited low acute oral toxicity in rats ($LD_{50} > 8\,000$ mg/kg), was not a skin irritant but was a slight eye irritant in rabbits. The polymer would not be classified as hazardous according to Worksafe Australia's *Approved Criteria for Classifying Hazardous Substances* (7) in relation to the toxicological endpoints studied.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicology data were provided, which is acceptable for polymers of number-average molecular weight (NAMW) greater than 1000 according to the Act.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

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

Environmental exposure to the notified substance could occur when paper

containing the polymer is recycled or disposed of. In each case, the final destination is likely to be landfill where the polymer can be expected to persist but remain immobile, being either bound to paper or to the sludge from the recycling process.

Exposure to the aquatic environment is not expected, but if it occurs it is expected to be at very low concentrations, thus the environmental hazard should be negligible. Accidental spillage of the polymer imported in cartridges should result in negligible hazard as they will be marketed for direct insertion into printers.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The toxicological data provided suggest that the notified polymer would exhibit low acute oral toxicity, would not be a skin irritant and may be a slight eye irritant.

The notified polymer has a NAMW greater than 1000 and should not be absorbed across biological membranes to cause systemic effects. The levels of low molecular weight species (0.2 %) and residual monomers (maximum of 0.5 %) would not render the polymer hazardous according to the Approved Criteria (7).

Exposure to the notified polymer during replacement of ink cartridges and during printer maintenance should be negligible given its low level in ink formulations and the short duration of exposure.

The risk of adverse occupational and public health effects during transport, storage, use and disposal of the notified polymer is expected to be minimal given its likely low toxicity and the limited opportunities for exposure.

13. RECOMMENDATIONS

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

- 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 Material Safety Data Sheet (MSDS) should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The MSDS for a solution containing the notified chemical was provided in accordance with the *National Code of Practice for the Preparation of Material Safety*

Data Sheets (8).

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. In particular, if the method of use changes in such a way as to greatly increase the environmental exposure of the notified polymer. No other specific conditions are prescribed.

16. REFERENCES

1. Anliker R, Moser P & Poppinger D 1988, "Bioaccumulation of dyestuffs and organic pigments in fish. Relationships to hydrophobicity and steric factors". *Chemosphere* **17(8)**: 1631-1644.
2. Gobas F A P C, Opperhuizen A & Hutzinger O 1986, "Bioconcentration of hydrophobic chemicals in fish: relationship with membrane permeation". *Environmental Toxicology and Chemistry* **5**: 637-646.
3. Dickhaus S and Heisler E 1994, *Acute Toxicological Study of Compound BYK-LP-N-6482 after One Oral Application to the Rat*, Project No. 4-94-94, Pharmatox GmbH, Hannover.
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5. Dickhaus S and Heisler E 1994, *Irritant Effects of BYK-LP-N-6482 on Rabbit Eye*, Project No. 3-96-94, Pharmatox GmbH, Hannover.
6. Organisation for Economic Co-operation and Development, *OECD Guidelines for Testing of Chemicals*, OECD, Paris, France
7. National Occupational Health and Safety Commission 1994, *Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1994)]*, Australian Government Publishing Service, Canberra.
8. National Occupational Health and Safety Commission 1994, *National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011(1994)]*, AGPS, Canberra.