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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Polymer in Setafix P-120

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**Polymer in Setafix P-120****1. APPLICANT**

Akzo Nobel Chemicals of 6 Grand Avenue CAMELLIA NSW 2142 has submitted a limited notification statement in support of their application for an assessment certificate for Polymer in Setafix P-120.

2. IDENTITY OF THE CHEMICAL

Polymer in Setafix P-120 is not considered to be hazardous based on the nature of the chemical and the data provided. Therefore the chemical name, CAS number, molecular and structural formulae, molecular weight, spectral data, details of the polymer composition, and details of exact import volume and customers have been exempted from publication in the Full Public Report and the Summary Report.

Trade Name: Setafix P-120

**Number-Average
Molecular Weight (NAMW):** < 5 000

**Weight-Average
Molecular Weight:** < 10 000

**Maximum Percentage of Low
Molecular Weight Species**

Molecular Weight < 500: < 10 %

Molecular Weight < 1 000: < 30 %

**Method of Detection
and Determination:** molecular weight distribution determined with gel permeation chromatography (GPC); structure characterised by infrared (IR) spectroscopy.

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	yellow solid
Boiling Point:	not determined
Specific Gravity:	1.150 kg/m ³
Vapour Pressure:	not determined
Water Solubility:	not determined
Partition Co-efficient (n-octanol/water):	not determined
Hydrolysis as a Function of pH:	not determined
Adsorption/Desorption:	not determined
Dissociation Constant:	not determined
Flash Point:	not determined
Flammability Limits:	not determined
Autoignition Temperature:	not determined
Explosive Properties:	polymer is stable
Reactivity/Stability:	polymer is stable

Comments on Physico-Chemical Properties

No melting point data were provided with the notification, but the Material Safety Data Sheet (MSDS) states that the melting point for the notified polymer is greater than 80°C. This is consistent for a polymer intended to be used as a thermoplastic matrix for print pigments. Vapour pressure of the notified polymer will be low due to the high molecular weight.

The polymer molecule contains one terminal carboxylic acid group, but this is the only polar group in a high molecular weight molecule of essentially hydrophobic character. Consequently, water solubility is expected to be low.

The polymer contains some ester linkages which could be expected to undergo hydrolysis under extreme pH conditions. However, due to the anticipated low water solubility, this is unlikely in the environmental pH range of between 4 and 9.

Although no partition co-efficient or adsorption/desorption data were provided for the material, the hydrophobic character indicates that the substance would partition into the oil phase, adsorb to, and become associated with the organic component of soils and sediments.

No dissociation constant data were provided, but since each polymer molecule contains one terminal aromatic carboxylic acid functionality, the material would be expected to display weakly acidic properties. However, the low water solubility should preclude manifestation of the inherent weakly acidic nature of the polymer.

4. PURITY OF THE CHEMICAL

Degree of Purity: > 90%

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

**Maximum Content
of Residual Monomers:** < 1%

Additives/Adjuvants: none

5. USE, VOLUME AND FORMULATION

The notified polymer will not be manufactured in Australia but will be imported as a component of a toner product to be used in photocopying equipment. The material will be imported in sealed cartridges containing up to 1.4 kg of toner in quantities greater than one tonne per annum.

6. OCCUPATIONAL EXPOSURE

The notified polymer will arrive as an ingredient (50%) in a toner, pre-packed in plastic cartridges, ready for direct installation into photoelectric copiers. There will be no re-packing or re-formulating of the imported product. Under normal circumstances, worker exposure to the notified polymer will be minimal since the cartridges in which the notified polymer is packed will remain sealed at all times. Exposure will only occur in the unlikely event of an accident or damage to packaging.

End-users of the product containing the notified polymer will have minimal exposure since it is inserted into the photo-electric copier in the sealed container. Maintenance workers may be exposed to the toner dusts, in which case exposure to the notified polymer will be relatively high.

7. PUBLIC EXPOSURE

The notified polymer will enter the public domain on the surface of copied matter, in which form it is fused and fixed. This, combined with the low water solubility of the polymer, indicates that exposure to the public via handling printed matter is likely to be negligible. The public is also subject to exposure to the polymer through toner dust emissions in copy rooms, however with emissions estimated at 0.1 mg/m^3 , their significance to public health are expected to be low. Exposure of the public to the notified polymer during cartridge replacement will also be minimal since the notifier states that loss of the notified polymer in toner dust emissions will be less than 1% from empty cartridges. There may be some leakage if the cartridge is damaged during transport or handling, but this is also likely to result in minimal exposure.

The notifier states that the residual monomers and impurities are expected to be trapped within the polymer matrix and that leaching is expected to be negligible.

8. ENVIRONMENTAL EXPOSURE

Release

In the course of usage of the toner, the notified polymer may be released as a result of spills, as a component of toner dust emissions and as residual material left in used cartridges.

In the case of spills, which are expected to cause losses of around 1% of toner, the material will be collected and disposed of with other office waste to landfill or incinerators. Toner dust emissions from photocopiers are small, and loss of the notified material via this route is estimated at less than 1% and would most likely be picked up in vacuum cleaner dust and disposed of to landfill with general cleaning waste. Used cartridges are anticipated to contain up to 5% unused toner. The majority of used cartridges are expected to be disposed of with general office waste and placed into landfill where release of toner should occur only after destruction of the integrity of the cartridge.

In normal use the product will be incorporated into a thermo-cured resin (i.e. the print) and firmly bound to the paper substrate in a thermoplastic matrix which offers little potential for release.

The major avenue for release to the environment will be through disposal of the waste paper, and the anticipated fate of the material would be associated with that of the paper, and is described below.

Fate

The majority of the notified polymer will be associated with the print as the pigment binding medium. Here, it will be bound strongly to paper as a plastic film. Waste paper disposal is effected either through high temperature incineration, recycling or deposition into landfill.

High temperature incineration would destroy the compound with production of water vapour and evolution of oxides of carbon. Similarly, it is expected that during the extensive repulping and bleaching procedures implied by paper recycling the material would be either destroyed chemically or be incorporated into waste sludge. The material will not be appreciably soluble in water and it is likely that the polymer will be either destroyed through chemical action or become associated with the recycling plant waste sludge.

Waste sludge from the recycling plants would be either incinerated or disposed of to landfill, while aqueous waste would be comprehensively treated prior to discharge.

Again some waste paper may be disposed of directly to landfill, and it is anticipated that prolonged residence in an active landfill environment would eventually degrade the notified substance. The same considerations will apply to waste sludge from paper recycling if disposed of to landfill.

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicological data were provided, which is acceptable for polymers NAMW greater than 1 000 according to the Act.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicology data were provided, which is acceptable for polymers of NAMW greater than 1 000 according to the Act.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The environmental hazard from the notified polymer appears to be minimal, and in the event of accidental spillage or release of the toner, the clean up operation would probably entail disposal to landfill. Environmental releases from use and in the disposal of used cartridges are low.

Most of the notified polymer will be released to the environment as a result of disposal of waste paper. The “long-term” fate of the majority of the notified polymer will be associated with that of the paper and is expected to be either paper-recycling, landfill disposal or incineration. In all three cases it is anticipated that the material would be destroyed either through the agency of a vigorous chemical environment or through slow biological or abiotic processes. Even in the absence of substantial degradation, the diffuse nature of disposal patterns would indicate slow release into the wider environment, and this at low concentrations.

At concentrations likely to arise as a consequence of normal disposal procedures for the residual toner product and waste paper, the notified polymer appears to offer little cause for concern in respect of the aquatic environment.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

Considering the high NAMW of the notified polymer, it is unlikely to be able to pass through biological membranes. Furthermore, the vapour pressure and water solubility of the notified polymer are expected to be low, the residual monomer levels are less than 5%, and the percentage of species with molecular weight less than 1 000 is low. These factors indicate that hazard to human health is low.

Worker exposure to the notified polymer will be limited by pre-packaging in toner cartridges. Exposure is only likely to occur during transport and storage in instances where the cartridges are accidentally broken. The health and safety effects for workers involved in photocopying are likely to be negligible. Higher levels of exposure may be anticipated for workers involved in the maintenance of machines.

Public exposure to the notified polymer is possible in the event of an accident during transport and storage. The likelihood of a substantial spill occurring is low in view of the packaging. Public contact with the notified polymer may also occur through handling printed pages, but as this is in a fused, fixed form, and since the water solubility of the polymer is very low, the potential for public exposure is negligible.

13. RECOMMENDATIONS

To minimise occupational exposure to Polymer in Setafix P-120 the following guidelines and precautions should be observed:

- Spillage of the notified polymer 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 MSDS should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The MSDS for the product containing the notified polymer was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (1).

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 polymer 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

1. 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.