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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC/SUMMARY REPORT

POLYMER C-65

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 Department of the Environment, Sport, and Territories 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.

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Director
Chemicals Notification and Assessment

FULL PUBLIC/SUMMARY REPORT

POLYMER C-65

1. APPLICANT

S. C. Johnson & Son Pty Ltd of 160 Epping Road, Lane Cove, NSW 2066.

2. IDENTITY OF THE CHEMICAL

The Polymer C-65 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, as amended* (the Act). The polymer meets the criteria for a synthetic polymer of low concern specified in regulation 4A of the Act and can be considered to be of low hazard to human health. Therefore, the chemical name, molecular and structural formulae and polymer constituents have been exempted from publication.

Trade name(s): Polymer Emulsion C-65

Molecular weight:

Number-average molecular weight: 7,536

Weight-average molecular weight: 194,900

Maximum percentage of low molecular weight species
. **(molecular weight < 1000):** 5%
. **(molecular weight < 500):** 2.7%

Method of detection and determination: Gel Permeation Chromatography

3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer will be imported as a 33% emulsion in water. Unless otherwise stated, the following physico-chemical parameters refer to the emulsion.

Appearance at 20°C and 101.3 kPa: Milky white emulsion

Odour: Characteristic odour (not specified)

Boiling Point: 100°C

Density: 1029 kg/m^3

Vapour Pressure:	2.33 kPa at 20°C
Water Solubility:	<0.1 mg/L at 23°C (notified polymer)
Flammability Limits:	Not available
Decomposition Temperature:	Stable to 275°C, will decompose to monomers at 300°C
Autoignition Temperature:	Not available
Explosive Properties:	Not available
Reactivity/stability:	May hydrolyse at high pH (>12) and temperatures
Particle size distribution:	60 - 70 nm in the emulsion

Comments on physico-chemical data:

The water solubility of the polymer could not be measured. The detection limit of the analytical method used (OECD TG 105) is stated to be 0.1 ppm.

The Commonwealth Environment Protection Agency (CEPA) notes the polymer contains ester groups that may be susceptible to hydrolysis. However, the low water solubility of the polymer indicates it is unlikely to hydrolyse under environmental conditions. Also, the notifier states that at the final product pH 8.5, the polymer may swell but not dissolve. Samples are claimed, without supporting evidence, to have been placed at elevated temperatures of 50°C and 60°C without measurable hydrolysis over a 12 month period.

CEPA notes the polymer contains an appreciable amount of free carboxylic acid groups expected to have typical polycarboxylate acidity. The amount of ionisation at the high end of the pH 4-9 range is unclear.

4. PURITY OF THE CHEMICAL

The total amount of residual monomers is less than 0.2% by weight.

5. INDUSTRIAL USE

Polymer C-65 will be used in a water-based sealer finish for floor maintenance.

The intended import volume is estimated to be 1-5 tonnes in the first year, increasing to 20 tonnes by the fifth year.

6. OCCUPATIONAL EXPOSURE

Polymer C-65 as the emulsion will be imported and stored in 200 L drums

One truck driver and one forklift driver will be involved in the transfer of the containers to the storage site. In the mixing room, the polymer C-65 will be pumped from the storage drums into the mixing vessel. The notifier has not supplied formulation details for the final product. Three mixing room operators will be involved. After the mixing operation is completed the finished product is transferred to holding tanks prior to filling. The finished product then is transferred to 5 L containers which are filled and capped by an automated process. Three workers operate the packing.

7. PUBLIC EXPOSURE

There is low potential for public exposure to Polymer C65 during shipment and distribution.

At the manufacturing site any spills are expected to be contained through bunding and the collected material is to be disposed of through an approved waste collection agency.

The public should not be directly exposed to the polymer during processing. As the finished product will be used in commercial premises such as supermarkets and department stores, there is some potential for public exposure.

8. ENVIRONMENTAL EXPOSURE

· Release

Each 3400 L batch of floor sealer finish will use approximately 1400 L of Polymer C65. In the first year it is expected that 9 batches will be made. The principle source of loss will be tank washings where up to 10 kg of polymer may be lost. All tank washings and floor drains are collected in a balance tank equivalent to 3 days discharge. This effluent is pumped through a trickle tower and pH adjustment prior to discharge to North Head Sewer Treatment works. From November a dissolved air flotation unit will be installed to treat effluent with sludge being disposed of through an approved trade waste operator at an appropriate landfill.

Widely dispersed release to the environment is likely as the cleaners responsible for maintaining these commercial premises will wash application mops and equipment. Washings from cleaning equipment are likely to be washed down the drain with significant volumes of water.

When the floor finish is damaged, the cleaner may strip the floor which will result in the polymer being disposed to sewer.

As floor polishes are only stripped when significant wear has taken place it is estimated that 20% (2400 kg) of polymer laid would enter the sewer system. The remainder being abraded off the floor over a period of time (6 months).

Environmental studies are claimed to have shown in the US (reports not provided by the notifier) that this type of styrene/acrylic polymer is removed in sewage treatment plants through coagulation with cationic polyelectrolytes to form part of the sludge that is disposed at landfill. This appears to suggest considerable ionisation is possible.

Empty containers are generally disposed of via normal garbage routes for consignment to council landfills. It is estimated that 50 kg per annum of polymer would be disposed of in these ways.

- **Fate**

The polymer is unlikely to readily biodegrade or hydrolyse under environmental conditions due to its low water solubility, its high molecular weight and the claimed coiled nature of the polymer chains.

When waste polymer is disposed to sewer it is likely to settle out and become associated with the sludge at the water treatment works, due to its low water solubility and large molecular weight and size.

Polymer that is disposed to landfill will remain at the site of deposition and is unlikely to leach due to its physico-chemical characteristics.

Although the polymer is insoluble in water and is not readily degraded, it is unlikely to bioaccumulate because of its large molecular size.

9. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided, which is acceptable for synthetic polymers of low concern. However, it should be noted that polycarboxylates can have toxicity to algae (1).

10. ASSESSMENT OF ENVIRONMENTAL HAZARD

Waste polymer generated during product formulation (~10 kg per batch) is unlikely to present a hazard to the environment as the factory effluent will be treated before discharge to sewer and the polymer is expected to be associated with the sludge.

Polymer (contained in sludge or empty containers) that is disposed to landfill will present a negligible hazard to the environment as the polymer will remain at the site of deposition and is unlikely to leach due to its physico-chemical characteristics.

The disposal of the polymer to sewer as a result of the washing of floor-cleaning equipment, stripping of floors and the abrading of finish from floors from traffic and cleaning is unlikely to present a hazard to the environment as the release will be dispersed across Australia (predominantly in the urban regions) and the environmental concentration of the polymer in the receiving waters should be very low. The polymer is expected to be associated with the sludge at sewerage treatment works.

The expected very low concentration of the polymer in aquatic environments and the polymer's high molecular weight and large molecular size indicates the hazard to aquatic organisms should be minimal.

11. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The most likely route of exposure to the notified chemical is by the oral or dermal routes. Eye contact is also possible. The Material Safety Data Sheet states that the polymer C-65 may cause skin and eye irritation. Therefore, skin and eye contact with the notified chemical should be avoided.

Although the particle size relatively small, the notified polymer will be imported and used as an emulsion. Therefore, inhalation of particles is unlikely.

12. RECOMMENDATIONS

To minimise occupational exposure to Polymer C-65 the following guidelines and precautions should be observed:

. eye and skin contact with the chemical should be minimised;

. good housekeeping and maintenance should be practised. Any spills should be promptly cleaned up;

. good personal hygiene should be observed; and

. a copy of the Material Safety Data sheet for Polymer C-65 should be easily accessible to employees.

13. MATERIAL SAFETY DATA SHEET

A Material Safety Data Sheet (MSDS) for Polymer Emulsion C-65 (Attachment 1), was provided in Worksafe Australia format (7). This MSDS was provided by S. C. Johnson 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 S. C. Johnson Pty Ltd.

14. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989* (the Act), secondary notification of Polymer C-65 shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. The Director of Chemicals Notification and Assessment should be informed if there are significant changes to worker or public exposure.

15. REFERENCES

1. "EPA Proposed Revision of Expanded Criteria for Exempting Polymers from Premanufacture Notification", Chemical Regulation Reporter, 12 Feb. 1993, p2226-2247.

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

6. 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.

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