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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME (NICNAS)**

FULL PUBLIC REPORT

CGH POLYMER

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT**CGH POLYMER****1. IMPORTER**

Kodak (Australasia) Pty Ltd, 173 Elizabeth Street, Coburg, VIC 3058.

2. IDENTITY OF THE CHEMICAL

Trade names: CGH polymer; Silicone block copolymer

Number-average molecular weight: 33,000

Maximum percentage of low molecular weight species (molecular weight < 1000): < 0.1% (w/w)

Maximum content of residual monomers: <0.3% (w/w)

3. PHYSICAL AND CHEMICAL PROPERTIES

CGH polymer is a white, non-volatile powder with no discernible odour at room temperature and atmospheric pressure. Its physical and chemical properties include:

Glass-transition temperature: 88.6°C

Stability: will not decompose significantly at temperatures less than 380°C

Pyrolysis products: on combustion of the polymer, carbon dioxide and toxic fumes such as carbon monoxide and oxides of nitrogen would be emitted.

Water solubility: < 1g/L (detection limit)

4. METHOD OF DETERMINATION

CGH polymer is a minor constituent (< 2%) of a toner product. Airborne toner particulates can be sampled on appropriate filters in accordance with Australian Standard AS 3640-1989(1). The polymer constituents can be extracted in organic solvents such as tetrahydrofuran (THF), and then separated by size exclusion chromatography (SEC).

5. PURITY OF THE CHEMICAL

Note: the impurities represent a mixture of chemicals which generally have low acute oral toxicities in test animals but are mild to moderate irritants to the eyes and skin. Present at an overall concentration of less than 0.3 % by weight of the polymer, these impurities are unlikely to pose a significant health hazard.

6. INDUSTRIAL USES

CGH polymer is intended to be used exclusively as a solid lubricant in commercial photocopier toner formulations (Kodak Coloredge Cyan Toner and Kodak Coloredge Yellow Toner). These formulations will contain < 2% by weight of the CGH polymer. The formulations will be imported in sealed polyethylene cartridges each containing 350 grams of the products.

Other ingredients of the formulations are polyester* (CAS No. 120611-31-6), cyan phthalocyanine pigment* (for Cyan Toner only), yellow azo pigment (for Yellow Toner only) and CA-10*.

The estimated quantity of CGH polymer to be imported into Australia is less than 50 kilograms per year for the first five years.

*Note: full public reports and summary reports for these substances have been published by the Director of Chemicals Notification and Assessment, under subsection 38(5) of the Industrial Chemicals (Notification and Assessment) Act 1989.

7. PUBLIC AND OCCUPATIONAL EXPOSURE

The formulations will be imported into Australia in sealed cartridges which are ready to use in photocopiers. Only the seal of the cartridge needs to be opened immediately before use. No reformulation, packaging, bottling, filling or refilling of containers needs to be carried out in Australia. After use, the formulated product will be fused to paper in a water insoluble polymer matrix. Therefore, it can be expected that there will be very low public and worker exposure to CGH polymer and the formulated toner products under normal use conditions.

However, photocopier maintenance workers who frequently come into direct contact with the toner powder will have higher exposure through skin contact and inhalation.

8. ENVIRONMENTAL EXPOSURE

8.1 Release

As the formulated toner will only be used for office photocopying, it is expected that only a negligible amount of toner waste would be generated or released to the environment.

8.2 Fate

The quantity of waste toner that will need to be incinerated or disposed of in a landfill is expected to be very small.

Paper to which the polymer is fixed will ultimately be incinerated, disposed of in a landfill, or recycled. When incinerated, the polymer will be degraded to oxides of carbon, nitrogen and silicon. When disposed in a landfill, because of its high molecular weight, the polymer should not readily biodegrade and, therefore, is likely to persist. (Note: generally, polymers need to be reduced to a molecular weight of 500 before biodegradation can occur(2).)

Wastepaper is usually repulped in a pulper which utilises a number 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(3). It is likely that in the recycling processes, the

polymer will either be degraded, or removed in a sludge that is expected to be incinerated.

9. EVALUATION OF TOXICOLOGICAL DATA

9.1 Absorption

The key factors which appear to determine absorption of a chemical by an organism are its molecular weight and lipophilicity. It is generally believed that as molecular weight increases, absorption decreases. Although it is not possible to identify any single molecular weight limit above which no absorption will occur, the available information suggests that substance with molecular weights greater than 400 are generally not readily absorbed through the intact skin and that substances with molecular weights greater than 1000 are generally not readily absorbed through the intact gastrointestinal tract(4).

Given its high molecular weight and low polydispersity (maximum percentage of low molecular weight species molecular weight < 1000 = < 0.1%), it is believed that the CGH polymer would not be readily absorbed through the intact skin and gastrointestinal tract, and therefore, should not pose a significant acute toxicity risk.

9.2 Acute Toxicity

No toxicological studies were presented for CGH polymer.

9.3 Overall Assessment

Due to its high molecular weight and predicted low potential for absorption, it is expected that the polymer will have minimal systemic toxicity and low acute oral and dermal toxicities. However, because of its physical form as a fine powder, the polymer may slightly irritate the eyes and upper respiratory tract.

10. ENVIRONMENTAL ASSESSMENT

10.1 Assessment of Environmental Effects

Due to its high molecular weight and small proportion of low molecular weight species, the polymer is likely to be of low bioavailability.

10.2 Assessment of Environmental Hazard

From its low environmental exposure as a result of normal use and its predicted low toxicity, the polymer should pose a low environmental hazard.

Environmental exposure to the polymer could occur through two main routes: when paper containing the polymer is recycled; and when such paper is disposed in a landfill. However, because the quantity of polymer that will be fixed to paper as a result of photocopying is relatively small and that the polymer is likely to be degraded in paper recycling, the environmental exposure to the polymer or to its degradation products is likely to be low.

Accidental spillage of the polymer should also result in negligible hazard to the environment, given its physical state as a solid and low water solubility.

11. Assessment of Public and Occupational Health and Safety Effects

Public and worker exposure to the CGH polymer and the formulated toner products is likely to be minimal under normal use conditions. From its predicted low acute toxicities and its low irritating potential to the eyes and upper respiratory tract, exposure to CGH polymer should not pose a significant acute health and safety hazard to the public and workers.

12. RECOMMENDATIONS FOR THE CONTROL OF PUBLIC AND WORKER EXPOSURE

To minimise public and worker exposure to the CGH polymer and the formulated toner products, in general the following guidelines and precautions should be observed:

- . as a good work practice, photocopiers should be located in a well ventilated area to control the accumulation of any dusts, gases or fumes;
- . a copy each of the Material Safety Data Sheets of the formulated products should be made available to all personnel who may have exposure to the toner products; and
- . photocopier maintenance workers who frequently come into direct contact with the toner powders should:

- wear appropriate gloves (for example, cotton or impervious gloves);
- avoid the generation of a dust cloud; and
- observe good personal hygiene practices at work.

Note: guidance on the general working practices associated with the operation of office copying machines are available in *Worksafe Australia Guide on Office Copying Machines*(5).

13. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Industrial Chemicals (Notification and Assessment) Act 1989 (the Act), secondary notification of the CGH polymer shall be required by Kodak (Australasia) Pty Ltd if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed

14. REFERENCES

- (1) Standards Australia, AS 3640-1989 *Workplace Atmospheres - Method for Sampling and Gravimetric Determination of Inspirable Dust*, Standards Australia, Sydney, 1989.
- (2) Chemical and Engineering News, Vol 68, 26, p.13, 1990
- (3) Forestry Canada, Industry/Trade and Technology Directorate and Environment Canada, Final Report, *Waste Paper Study (to end of 1989)*, p.56-57
- (4) United States Federal Register, 40 CFR Part 723, *Premanufacture Notification Exemptions; Exemptions for Polymers*, 1984
- (5) National Occupational Health and Safety Commission, *Office Copying Machines*, AGPS, Canberra, December, 1989