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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

ALKYD RESIN POLYMER

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For Enquiries please contact Ms Tina Anderson at:

Street Address: 92 Parramatta Rd Camperdown, NSW 2050, AUSTRALIA
Postal Address: GPO Box 58, Sydney 2001, AUSTRALIA
Telephone: (61) (02) 565-9466 **FAX (61) (02) 565-9465**

Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

ALKYD RESIN POLYMER

1. APPLICANT(S)

Mita Copiers Australia Pty Ltd, 25 Sirius Road, Lane Cove 2066.

2. IDENTITY OF THE CHEMICAL

Based on the nature of the chemical and the data provided, Alkyd resin polymer is not considered to be hazardous. Therefore, the details of chemical name, CAS number, structural formula and spectral data have been exempted from publication in the Full Public Report.

Other name: Alkyd resin, polymer

Trade name(s): C184

Molecular weight: Expected to be >1000

Maximum percentage of low molecular weight species

(molecular weight < 1000): Not known

.(molecular weight < 500): Not known

Method of detection and determination:

The polymer can be identified by infrared spectroscopy.

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa: Yellow/white solid

Odour: None

Glass-transition Temperature: Not determined

Density: 1100-1250 kg/m^3

Vapour Pressure:		Not applicable
Water Solubility:		Not soluble
Fat Solubility:		Not determined
Partition Co-efficient (n-octanol/water) log $P_{O/W}$:		Not determined
Hydrolysis as a function of pH:		
Adsorption/Desorption:		Not determined
Dissociation Constant pKa:		Not determined
Flash Point:		Not determined
Flammability Limits:		Not determined
Combustion Products:		Not determined
Pyrolysis Products:		Not determined
Decomposition Temperature:		Not determined
Decomposition Products:		Not determined
Autoignition Temperature:		Not determined
Explosive Properties:		Not determined
Reactivity/Stability:		Not determined
Particle size distribution:	range -	30-150 µm (the chemical coated carrier particles)

. **comments on physico-chemical properties**

Alkyd resins are usually highly insoluble in water but the polymer contains a significant proportion of triazines and tertiary amines functionalities which could increase the solubility in acid. Also, the polymer contains carboxyl ester

linkages that may be susceptible to hydrolysis. However, hydrolysis is unlikely from the present use. These aspects should be clarified in a secondary notification if wider environmental exposure is likely.

4. PURITY OF THE CHEMICAL

Degree of purity (of the notified chemical alone): 100%

5. INDUSTRIAL USE

The notified polymer is used as a coating, to control surface resistance of carrier(ferrite) particles used to carry toners in electrophoto-copying machines. The product contain <2% of the Alkyd resin polymer.

The projected import volume of the notified polymer is less than one tonne per annum for the next five years.

6. OCCUPATIONAL EXPOSURE

The notified polymer containing the developer is imported in sealed plastic bottles which will be placed directly into the photocopier machine.

The exposure to the notified polymer is possible as part of the following activities:

- fixing of plastic bag to the photocopier;
- transfer of the used developer from the photocopier to the plastic bag; and
- refilling of photocopier with new developer.

It is envisaged that personnel involved in the above activities will be exposed to the notified polymer for very short periods.

7. PUBLIC EXPOSURE

The public will be exposed to the notified polymer for short periods of time when loading the developer into photocopying machines.

8. ENVIRONMENTAL EXPOSURE

. Release

The notified polymer coats a ferrite particle (30-150 µm), the carrier, which is a component of the developer it will be imported into Australia in sealed plastic bottles. The developer is to be changed by a service technician using a specially designed plastic bag to prevent spills during transfer of the used developer and the new developer. The notifier does not expect release of the polymer during this process. The used polymer will be placed in a drum at the head office in Sydney by the service technicians and the drum will then be disposed of at an industrial disposal site. The risk of environmental exposure is minimal when the developer is changed according to the services manual.

When the photocopier is in use, there should not be any release of the ferrite particle onto the paper used during photocopying, thus the environmental exposure on disposal or recycling of paper would be very low.

During transport risk of environmental release is limited to accident where the plastic bottles or the plastic bags containing the used developer are ruptured.

• Fate

No information was presented on the environmental fate of the polymer. The polymer contains carboxylic esters links which may be expected to slowly undergo hydrolysis or degradation in landfill.

It has a large molecular weight and therefore unlikely to cross biological membranes, with the result 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 introduced in volumes < one tonne. However, the following studies, carried out on Alkyd resin, polymer (C184) and product Cu-Zn Ferrite, were submitted these are evaluated below.

Table 1 Summary of the acute toxicity of C184 and Cu-Zn Ferrite

Test	Species	Outcome	Reference
Oral(C184)	rat	LD50 >2000 mg/kg	(2)
Oral(Cu-Zn Ferrite)	rat	LD50 >5000 mg/kg	(3)
Skin(C184)	rabbit	non-irritant	(5)
Skin(Cu-Zn Ferrite)	rabbit	non-irritant	(6)
Eye(C184)	rabbit	slight irritant	(8)
Eye(Cu-Zn Ferrite)	rabbit	slight irritant	(9)

9.1.1 Oral Toxicity

These studies were carried out according to OECD Guidelines for Testing of Chemicals No.: 401 (1)

9.1.1.1 C184 (2)

A single dose of 2000 mg/kg of C184 in maize oil (20% w/v) was administered by gavage to Wistar outbred rats (5/sex). The animals were observed at 4 hours after dosing and subsequently once daily for 14 days. No deaths were noted during the study. All animals showed the expected gain in body weight over the study period. No gross abnormalities were noted at necropsy.

The results of this study indicate an oral LD_{50} of >2000 mg/kg for C184 in rats.

9.1.1.2 Cu-Zn Ferrite (3)

A single dose of 5000 mg/kg of Cu-Zn Ferrite in aqueous suspension (25% w/v) was applied by gavage to Wistar outbred rats (5/sex). The animals were observed at 4 hours after dosing and subsequently once daily for 14 days. No deaths were noted during the study. All animals showed the expected gain in body weight over the study period. No gross abnormalities were noted at necropsy.

The results of this study indicate an oral LD_{50} of >5000 mg/kg for Cu-Zn Ferrite in rats.

9.1.2 Skin Irritation

These studies were carried out according to OECD Guidelines for Testing of Chemicals No.: 404 (4).

9.1.2.1 C184 (5)

A single dose of 1.0 g of the test mixture (0.5 g of C184 and 0.5 cc tap water) was applied by occlusive application to the shaven flank of three male New Zealand White rabbits for four hours. The site of applicaion was examined approximately 1 hour after removal of the dressing in one animal and at 24, 48, and 72 hours after removal of the dressing in the other two animals. Skin reactions were assessed according to Draize (11). There were no signs of erythema or oedema in any of the animals.

The results of this study indicate that C184 is non-irritant to the skin of rabbit.

9.1.2.2 Cu-Zn Ferrite (6)

A single dose of 0.5 g of Cu-Zn Ferrite moistened with 0.25 cc of tap water was applied by occlusive application to the shaven flank of three male New Zealand White rabbits for four hours. The site of applicaion was examined approximately 60 minutes, 1, 2, and 3 days after removal of the dressing in all three animals.

Skin reactions were assessed according to Draize (11). There were no signs of erythema or oedema in any of the animals.

The results of this study indicate that Cu-Zn Ferrite is non-irritant to the skin of rabbit.

9.1.3 Eye Irritation

These studies were carried out according to OECD Guidelines for Testing of Chemicals No.: 405 (7).

9.1.3.1 C184 (8)

Three male New Zealand White rabbits were used in the study. Initially, a single dose of 0.06 g (0.1 ml) of C184 was instilled into the conjunctival sac of the right eye of each rabbit. The other eye which remained untreated, served as the control. Ocular reactions were assessed according to Draize (11) after 1 hour and 1, 2, and 3 days post-exposure. In two animals slight erythema and chemosis were observed at 1 hour post-exposure with slight erythema persisting up to 24 hours. In the other animal moderate erythema, slight chemosis and conjunctival discharge were observed at 1 hour post-exposure and slight erythema at 48 hour post-exposure. On day 2 all treated eyes appeared normal.

The results of this study indicate that C184 is a slight eye irritant in rabbits.

9.1.3.2 Cu-Zn Ferrite (9)

Three male New Zealand White rabbits were used in the study. Initially, a single dose of 0.26 g (0.1 ml) of Cu-Zn Ferrite was instilled into the conjunctival sac of the right eye of each rabbit. The other eye which remained untreated, served as the control. Ocular reactions were assessed according to Draize (11) after 1 hour and 1, 2, and 3 days post-exposure. In all three animals slight erythema and chemosis were observed at 1 hour post-exposure which persisted up to 48 hours. On day 3 all treated eyes appeared normal.

The results of this study indicate that Cu-Zn Ferrite is a slight eye irritant in rabbits.

9.2 Genotoxicity

9.2.1 Bacterial Reverse Mutation Assay

This study was carried out according to OECD Guidelines for Testing of Chemicals No.: 471 (11).

9.2.1.1 C184 (12)

C184 in carboxy methyl cellulose at dose levels of 10.0, 3.33, 1.11, 0.37, and 0.12 mg/plate was tested for gene mutation using Salmonella typhimurium strains TA98, TA100, TA1535, TA1537 and TA1538 both in the presence or absence of metabolic activation (S9-mix). The experiment was repeated using the same dose levels. Positive controls used were sodium azide with TA1535 and TA100 (without S-9 mix), 2-nitrofluorene with TA1538 and TA98 (without S-9 mix), 9-aminoacridine with TA1537 (without S-9 mix)) and 2-aminoanthracene with TA98, TA100, TA1535, TA1537 and TA1538 (with S-9 mix).

In both experiments the test substance did not induce statistically significant dose-related increases in the number of revertant colonies of *Salmonella typhimurium* strains both in the absence or presence of S-9 mix. The positive controls induced the expected increases in revertant colonies.

The results of this study indicate that C184 is not mutagenic.

9.2.1.2 Cu-Zn Ferrite (13)

Cu-Zn Ferrite in dimethyl sulfoxide at dose levels of 5, 1, 0.5, 0.1, 0.05 and 0.01 mg/plate was tested for gene mutation using Salmonella typhimurium strains TA98, TA100, TA1535, TA1537, TA1538 and WP2 uvrA both in the presence or absence of metabolic activation (S9-mix). Positive controls used were sodium azide with TA1535, 2-(2-furyl)-3-(5-nitro-2-furyl)acrylamide with TA98, TA100 and WP2 uvrA, 9-aminoacridine with TA1537 and 2-nitrofluorene with TA1538 (without S-9 mix) and 2-aminoanthracene with TA98, TA100, TA1535, TA1537, TA1538 and WP2 uvrA (with S-9 mix).

The test substance did not induce statistically significant dose-related increases in the number of revertant colonies of *Salmonella typhimurium* strains both in the absence or presence of S-9 mix. The positive controls induced the expected increases in revertant colonies.

The results of this study indicate that Cu-Zn Ferrite is not mutagenic.

9.3 Overall Assessment of Toxicological Data

C184 and Cu-Zn ferrite has low acute oral toxicity in rats (LD_{50}s >2000 mg/kg and >5000 mg/kg respectively). Both were slight eye irritants but not skin irritants in rabbits. C184 and Cu-Zn ferrite were found to be non mutageneic in the bacterial reverse mutation assay.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided, which is acceptable for polymers of NAMW > 1000 according to the *Act*.

There should be no environmental effects from the notified polymer when in normal use as there will be very limited exposure. In the event of an accident in which the developer, either fresh or used, is released clean up according to the MSDS sheets will prevent significant releases, with the minor amount left after clean-up being inert and not effecting biological systems.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The polymer is not expected to reach the environment apart from that which is released in accidents. Due to the large molecular weight of the polymer, these minor amounts are not expected to effect biological systems or cause an environmental hazard. The environmental hazard of he notified polymer is expected to be minimal.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

C184 has been shown in animal studies to have low acute oral toxicity. It is not a skin irritant. However, it is a slight eye irritant. Therefore, eye contact with the developer should be avoided.

The notified polymer coated carrier has a non-respirable particle size distribution.

As the notified chemical in toner will be imported in cartriges which are inserted directly into the photocopier, the occupational exposure is expected to be low.

Under normal use conditions, given the toxicological profile and physico-chemical properties of the notified polymer and low exposure, the notified chemical is unlikely to pose a significant risk to occupational and public health.

13. RECOMMENDATIONS

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

. Good work practices should be implemented to avoid spillages and generation of dust.

. Good personal hygiene should be observed.

. a copy of the Material Safety Data Sheet (MSDS) for product containing the Alkyd resin polymer notified polymer should be easily accessible to all employees.

14. MATERIAL SAFETY DATA SHEET

The Material Safety Data Sheet (MSDS) for Alkyd resin polymer (Attachment 1) was provided in Worksafe Australia format (19). This MSDS was provided by Mita Copiers 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 Mita Copiers Australia Pty Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

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

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3. Netherlands Organisation for Applied Scientific Research, "Substance Cu-Zn Ferrite: Acute Oral Toxicity to the Rat". Data on file, Report No: B 88-0060/32, August 1988.

4. OECD Guidelines for Testing of Chemicals, "Acute Dermal Irritation/Corrosion" No: 404, 1981.

5. Netherlands Organisation for Applied Scientific Research, "Substance C184: Skin Irritation to the Rabbit". Data on file, Report No: B 90-0061/29, September 1990.

6. Netherlands Organisation for Applied Scientific Research, "Substance Cu-Zn Ferrite: Skin Irritation to the Rabbit". Data on file, Report No: B 88-0061/26, July 1988.

7. OECD Guidelines for Testing of Chemicals, "Acute Eye Irritation/Corrosion" No: 405, 1987.

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9. Netherlands Organisation for Applied Scientific Research, "Substance Cu-Zn Ferrite: Eye Irritation to the Rabbit". Data on file, Report No: B 88-0069/19, July 1988.

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

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

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