File No: NA/371

Date: July 1996

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Modified urea formaldehyde polymer

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For Enquiries please contact the Administration Coordinator at:

Street Address: 92 Parramatta Rd Camperdown, NSW 2050, AUSTRALIA
Postal Address: GPO Box 58, Sydney 2001, AUSTRALIA
Telephone: (61) (02) 577-9466 **FAX (61) (02) 577-9465**

Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Modified urea formaldehyde polymer

1. APPLICANT

Sicpa Australia Pty Ltd of 3 Millers Road BROOKLYN VICTORIA 3025 has submitted a limited notification in support of their application for an assessment certificate for Modified urea formaldehyde polymer.

2. IDENTITY OF THE CHEMICAL

Modified urea formaldehyde polymer 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, weight percentage and composition have been exempted from publication in the Full Public Report and the Summary Report

The notified chemical contains no hazardous impurities at levels necessary to classify it as a hazardous substance (1). Therefore, information on the purity of the chemical has been exempted from publication in the Full Public Report and the Summary Report.

Other names:	Modified urea formaldehyde polymer
Trade names:	Beckamine® 93-210 (62% formulation)
Number-Average Molecular Weight (NAMW):	> 1000

3. PHYSICAL AND CHEMICAL PROPERTIES

The physico-chemical properties described are for the modified urea-formaldehyde polymer and not the formulation Beckamine® 93-210 containing 62% of the notified chemical, unless indicated otherwise. The polymer is expected to be stable at the environmental pH range of 4-9.

Appearance at 20°C and 101.3 kPa:	clear liquid (formulation)
Odour:	pungent aromatic odour (formulation)
Boiling Point:	117-142°C (formulation- calculated on the boiling points of the volatiles)

Density:	1025.7-1049.7 kg/m^3
Vapour Pressure:	4.2 - 6.2 mm Hg 20°C (formulation)
Water Solubility:	insoluble
Partition Co-efficient (n-octanol/water) log Pow:	not determined
Hydrolysis as a function of pH:	not determined
Adsorption/Desorption:	not determined
Dissociation Constant pKa:	not determined
Flash Point:	35°C (based on formulation)
Flammability Limits:	1.0 LEL to 11.2 UEL (based on formulation)
Combustion Products:	carbon monoxide, nitrous oxides, formaldehyde, carbon dioxide (formulation)
Decomposition Temperature:	not specified
Decomposition Products:	not specified
Autoignition Temperature:	343°C (based on n-butanol)
Explosive Properties:	not specified for polymer
Reactivity/Stability:	not specified for polymer, formulation will react with strong oxidisers

Comments on physico-chemical properties

No solubility data were available for this material. Urea formaldehyde polymers have no functional groups that would solubilise the polymer. No hydrolysis data were available for the notified polymer.

Partition coefficient data are not applicable as a polymer of this molecular size (NAMW > 1000) and low solubility is not expected to cross biological membranes. No measurement of adsorption/desorption was made. The polymer is not expected to dissociate under environmental conditions. The latter two properties would not be able to be determined for a polymer that is insoluble in water. The large, complex molecular structure also makes the measurement of such properties difficult.

4. PURITY OF THE CHEMICAL

Degree of purity:	62% within formulation
Toxic or hazardous impurities:	none
Non-hazardous impurities (> 1% by weight):	none

5. INDUSTRIAL USE

The notified polymer will be imported at 62% in the formulation, Beckamine® 93-210, which will be used as a component of a modified epoxy clear coating Dexter Product # 4800B04D for the ends of aluminium cans. Alternatively, the Dexter Product # 4800B04D may be imported already formulated, the notified chemical being contained at between 5-10% in solution. The estimated amount of either formulation to be imported over the next 5 years is 1-10 tonnes in the first year, rising to 100 tonnes per year for the next four years.

6. OCCUPATIONAL EXPOSURE

The notified chemical will be imported in the Beckamine® 93-210 formulation or the Dexter Product # 4800B04D within sealed steel drums to be stored by Sicpa within a flammable goods store. Exposure is only expected in the event of a spill.

To manufacture Dexter Product # 4800B04D at the Sicpa formulation site, solvents (xylene, ethyl benzene and n-butyl alcohol) will be pumped into a mixer, over which is a local fume extraction system. Beckamine® 93-210 will be pumped in, the mixer closed and mixed for 10 minutes, after which lubricants will be added with further mixing. A sample will be taken for quality control at this stage, at which further xylene may be added to achieve the appropriate formulation consistency. At this stage the notified polymer will be at a concentration between 5-10%. There is potential for exposure by splashing to a single worker who will control the entire process, this being completed within a normal shift (approximately 8 hours). The Dexter Product # 4800B04D formulation containing the notified chemical will then be filtered and drummed by another single worker who may also be exposed to the notified chemical by splashing. The mixing drums will receive periodic cleaning by workers, this also giving rise to potential exposure to the notified chemical. The waste material will be disposed by licensed hazardous waste disposal contractors.

The coating process will take place at Sicpa's coating facility, involving the pumping of Dexter Product # 4800B04D out of the steel drums in a coating room to the reverse roll coaters. These will automatically apply a film coating to sheet aluminium under local exhaust ventilation, the coating then being baked and cured within an oven equipped with an after burner for fume control. When changing coating materials it will be necessary to clean the coating heads with organic solvents using pumping equipment. The metal coating area will by manned by 16 shop floor

workers and 4 staff workers spread over three 8 hour shifts. There will be potential dermal exposure to the notified chemical during the cleaning of the application machinery and the connection/disconnection of pumping lines.

After the Dexter Product # 4800B04D has been cured, the metal will be fabricated into coffee and tea container ends.

7. PUBLIC EXPOSURE

The coated metal is used to make ends for food compatible cans. Consequently there may be significant public contact with food which has been intimately associated with the notified chemical in this cured form. The notifier states that both the formulation and coating processes will result in minimal material loss to the environment and hence minimal public exposure from these routes.

8. ENVIRONMENTAL EXPOSURE

. Release

The reformulation of the notified material will be carried out by Sicpa using mixing vessel equipment designed for this application. Mixing of the notified material with various solvents occurs in a slow mixer over a ten minute period. Samples are taken for analysis and quality control and the final product, adjusted for viscosity, is then filtered. At the reformulation site residual material from drums and transfer lines will be recycled where possible.

The formulated product, when supplied to Alcoa, will be pumped from the drums to the fountain of a reverse roll coater where it will be applied as a thin film of coating to the coil surface. The wet coil is fed into a drying and curing oven where the non-volatile components of the coating mixture chemically react. The notified polymer acts as the cross-linking agent in the epoxy coating. Following the curing process there is little or no residual unbound material.

The reverse roll coating method is very efficient and there is little waste generation by this process. Residual material is flushed back to drums for reuse wherever possible. When coating material changeover occurs the coating heads of the equipment are cleaned with the appropriate solvents and waste collected for disposal by high temperature incineration through a licensed contractor.

Any spillage of the notified polymer that may occur is to be contained by either sand, vermiculite, sawdust or other inert absorbent. Used absorbent is to be sealed in containers, labelled and disposed of to either landfill or high temperature incineration at approved disposal sites. Quantities of such material will be limited with safe handling of material.

After application, drying and curing the polymer is fixed to the surface of the metal sheet where it remains for the life of the article. The finished product is expected to

be exported to Asian countries where it will be further processed to make cans for tea and coffee.

. Fate

Almost all of the raw notified polymer can be recycled. The highest environmental exposure of the notified polymer is likely to be as landfill either directly from spillage or as the end product as coating material on cans disposed to landfill. Disposal to land fill is to be in accordance with local, state and federal regulations. Most residual material is expected to be disposed of by high temperature incineration.

The notified polymer, as a component of the coating material on sheet stock, is expected to be exported to Asian countries for final fabrication into metal cans for tea and coffee. While it is likely that some of these cans may be imported into Australia, it is difficult to determine an exact quantity. Polymer in this form may be disposed of to either landfill or recycling. The notified polymer, as a component of the final coating on metal cans, is expected to be inert and immobile and therefore have negligible effect in landfill. When recycled, the material is expected to be destroyed by incineration during the recovery of metals.

The notified material, in Beckamine® 93-210 and the formulated product Dexter Product #4800B04D, will be imported and supplied in 200 L steel drums. Residue from these drums is expected to be < 1%, or 1000 kg/annum at the highest import rates. The drums and residue are collected and disposed of by licensed disposal companies at both Sicpa's and Alcoa's sites. Residues are expected to be disposed of by high temperature incineration and will be converted to oxides of carbon and nitrogen.

During the coating process the notified material may be lost as residue when changing and cleaning the coating heads of the reverse roll coater. During cleaning, residues are collected for reuse where possible. The remaining material is washed off with solvent, collected and disposed of by licensed operators by high temperature incineration.

Hydrolysis is unlikely under normal environmental conditions and the polymer should undergo limited biodegradation. No bioaccumulation of the polymer is expected because of its large molecular size which is likely to inhibit membrane permeability and prevent uptake during exposure (2,3).

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicological data were provided for the notified polymer, which is acceptable for a synthetic polymer with a NAMW > 1000 under the Act.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

Ecotoxicological data are not required for polymers of NAMW >1000 according to the Act. The polymer is not expected to show ecotoxicity effects as it should not cross membranes and belongs to a class of polymers recognised by Nabholz *et al* (4) as being of low concern.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The polymer is unlikely to present a hazard to the environment when imported, stored, formulated and applied to sheet stock as described due to the very low release to the environment as most materials are consumed in the process. Due to the end use application and the high molecular weight of the polymer it is unlikely to be hazardous to aquatic organisms. Residues are expected to be disposed of by high temperature incineration and there is expected to be negligible release of the uncured polymer in the environment.

As final steps in the fabrication of cans are carried out in Asian countries the amount of cured polymer to be disposed of, or recycled, within Australia is unclear. The concentration of the polymer on the finished cans is expected to be low. It is also expected to be strongly bound to the metal and other components of the coating mixture. It is unlikely to be released into the environment under normal conditions and is expected to be inert and immobile.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

There is unlikely to be any significant risk of exposure to the notified chemical in Beckamine® 93-210 during importation or transportation due to the packaging in steel drums. However, these drums should remain sealed and away from any sources of heat or ignition due to the low flash point of the formulation.

The pumping of the notified chemical in Beckamine® 93-210, into the mixer for formulation may generate splashing to which a single worker may be exposed. It is expected that the worker will be equipped with safety goggles, coveralls and chemical resistant gloves during the transfer of the formulation, this also serving to minimise exposure to the notified chemical. As the mixing will occur in a closed system, there is not expected to be any risk of exposure. The same personal protective equipment is also expected to be worn by the single worker involved in the filling of the formulated Dexter Product #4800B04D into drums after filtration, due to the risk of dermal exposure by splashing. Cleaning of the mixing vessels will require similar personal protection due to the increased risk of direct exposure to the

residuals of formulated products which may contain hazardous constituents (i.e. xylene). This will serve to minimise any incidental exposure to the notified chemical. Local exhaust ventilation over the mixer should serve to reduce exposure to any fumes generated from hazardous constituents within either formulations.

During the coating application of the Dexter Product #4800B04D there may be exposure to the notified chemical during the connection of pumping lines. The direct pumping of the notified chemical into the coating machine will serve to minimise exposure. There may be the risk of exposure to fumes from solvents used in the coating formulation. However there is local exhaust ventilation over the coating machines that should minimise exposure to any fumes from the formulation or the notified chemical. There is the risk of direct exposure to the notified chemical during the cleaning of the coating machinery, requiring the use of protective goggles, coveralls, chemical resistant gloves and respiratory protection. The risk of exposure may be minimised by the use of pumping machinery to clean the applicator, thereby reducing the risk of direct contact.

Once the notified chemical is baked within the coating formulation, there is little chance of any exposure occurring to any workers involved in the fabrication of metal ends for cans as the notified chemical will be cross linked and cured within the epoxy coating.

The chemical will be incorporated at a maximum concentration of 6.2% w/w in the coating mixture which will be applied to metal used as ends in food-compatible cans. Consequently there will be significant public contact with food which has been intimately associated with the notified chemical in this cured form. However the notified substance is unlikely to pose a toxicological hazard in this cured form. The potential for minor public exposure to the uncured chemical exists during transport and disposal of the chemical if accidentally spilt. This should be minimised by the recommendations outlined below.

13. RECOMMENDATIONS

To minimise occupational exposure to Modified urea formaldehyde polymer the following guidelines and precautions should be observed:

- General ventilation should be utilised during use, with local exhaust ventilation being implemented where there is the likelihood of localised aerosol or fume generation.

- If engineering controls and work practices are insufficient to reduce exposure to Modified urea formaldehyde polymer to a safe level, then:

  - the appropriate respiratory device should be selected and used in accordance with Australian Standard/ New Zealand Standard (AS/ NZS) 1715 (5) and should comply with AS/NZS 1716 (6).

  - eye protection should be selected and fitted in accordance with AS 1336 (7) and AS/NZS 1337 (8).

- industrial clothing should conform with the specifications detailed in AS 2919 (9).

- industrial gloves should conform with the standards detailed in AS 2161 (10).

- Particular care should be taken to avoid spillage or splashing of the notified chemical; should spillage occur, the recommended personal protective equipment should be worn, all sources of ignition should be removed, and the area ventilated if possible; the spill should be contained with an inert absorbent material such as sawdust or vermiculite and placed in a closed container to be disposed of by licensed hazardous waste disposal contractors.

- The use of formulations containing the notified chemical should take into account the presence n-butanol, xylene, ethyl benzene and formaldehyde, and the appropriate safety precautions taken to avoid exposure and minimise spills.

- The notified chemical or formulations containing the notified chemical, should be stored in a cool, dry area away from heat, ignition sources or oxidising agents.

- 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 Material MSDS for Modified urea formaldehyde polymer was provided in an acceptable format according to Worksafe Australia's *National Code of Practice for the Preparation of Material Safety Data Sheets* (11).

This MSDS was provided by Sicpa Australia Pty Ltd as part of the notification statement. The accuracy of this information remains the responsibility Sicpa Australia Pty Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of Modified urea formaldehyde 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. Worksafe Australia, 1994, *Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1994)],* AGPS, Canberra.

2. Anliker *et al.* 1988. Chemosphere, **17**, 1631-1644.

3. Gobas *et al.* 1986. Environmental Toxicology and Chemistry, **5**, 637-646.

4. Nabholz, JV, Miller, P, and Zeeman, M, *Environmental risk assessment of new chemicals under the Toxic Substances Control Act TSCA* Section Five. In WG Landis, JS Hughes and MA Lewis (eds), Environmental Toxicology and Risk Assessment.

5. Standards Australia, Standards New Zealand, 1994, *Australian/New Zealand Standard 1715-1994 Selection, Use and Maintenance of Respiratory Protective Devices.* Standards Association of Australia Publ., Sydney, Australia, Standards Association of New Zealand Publ. Wellington, New Zealand.

6. Standards Australia, 1991, *Australian Standard 1716-1991 Respiratory Protective Devices,* Standards Association of Australia Publ., Sydney, Australia.

7. Standards Australia , 1994, *Australian Standard 1336-1994, Recommended Practices for Eye Protection in the Industrial Environment.*, Standards Association of Australia Publ. Sydney, Australia.

8. Standards Australia, Standards New Zealand 1992, *Australian/ New Zealand Standard 1337-1992, Eye Protectors for Industrial Applications*, Standards Association of Australia Publ., Sydney, Australia, Standards Association of New Zealand Publ. Wellington, New Zealand.

9. Standards Australia, 1987, *Australian Standard 2919 - 1987 Industrial Clothing,* Standards Association of Australia Publ., Sydney, Australia.

10. Standards Australia, 1978, *Australian Standard 2161-1978, Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves*), Standards Association of Australia Publ., Sydney, Australia.

11. National Occupational Health and Safety Commission, *National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011(1994)],* AGPS, Canberra.