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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

MODIFIED ALKYD IN CRODAKYD S99

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT
MODIFIED ALKYD IN CRODAKYD S99

1. APPLICANT

A C Hatrick Chemicals Pty Ltd of 49-61 Stephen Road BOTANY NSW 2019 has submitted a limited notification for assessment of the modified alkyd in Crodakyd S99.

2. IDENTITY OF THE CHEMICAL

Based on the nature of the chemical and the data provided, modified alkyd in Crodakyd S99, is considered to be non-hazardous. Therefore, the chemical name, CAS number, molecular and structural formulae, molecular weight, composition of the chemical, purity, methods of detection and determination, spectral data and process description have been exempted from publication in the Full Public Report and the Summary Report.

Other name: styrenated alkyd

Trade names: Crodakyd S99, and coded for sale as 01299

Method of detection and determination: the modified alkyd is identified using Infrared (IR) spectroscopy; fatty acid type and proportion is carried out by forming methyl esters and analysing with gas liquid chromatography (GLC)

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa: formulation is an amber viscous liquid

Odour: formulation has a xylene odour

Melting Point/Boiling Point: not known

Density: 1.139 kg m⁻³ (temperature not given)

Vapour Pressure: not known

Water Solubility: expected to be insoluble

Fat Solubility: not available

Partition Co-efficient

| | |
|--|---|
| (n-octanol/water) log P_{ow}: | not available |
| Hydrolysis as a function of pH: | not available |
| Adsorption/Desorption: | very limited |
| Dissociation Constant: | not available |
| Flash Point: | not available |
| Flammability Limits: | not available |
| Combustion Products: | CO and/or CO ₂ |
| Pyrolysis Products: | not available |
| Decomposition Temperature: | not available |
| Decomposition Products: | not available |
| Autoignition Temperature: | not available |
| Explosive Properties: | not available |
| Reactivity/Stability: | will burn in a general fire and degrade when in contact with oxidising agents |
| Particle size distribution: | not applicable (liquid) |

- **Comments on physico-chemical properties**

The complex structure and high molecular weight and very few polar groups would indicate low water solubility. Also, as the polymer is a styrenated alkyd, a large contributor to the molecular weight species <1000 would be polystyrene and low molecular weight alkyd fractions - both are water insoluble.

It is unlikely to hydrolyse at neutral pH or in the environmental range of 4 to 9, however due to the ester linkages present hydrolysis (saponification) would occur at a more alkaline pH.

As the polymer is non-volatile and is a viscous semi-solid with very low mobility, it would be expected to adsorb to (or be associated with) the soil or sediment. Hence, the migratory tendencies of the chemical into the air, water and soil would be limited.

Incomplete combustion can yield, in addition to oxides of carbon, possible toxic vapours with an unknown composition.

4. PURITY OF THE CHEMICAL

Toxic or hazardous impurity: below level where notified chemical would be classified as hazardous according to criteria of Worksafe Australia (1).

Additive/Adjuvant:

| | |
|---------------------------|--------------------------------------|
| Chemical name: | xylene |
| CAS No.: | 1330-20-7 |
| Weight percentage: | 49-51% in formulation (Crodakyd S99) |

5. INDUSTRIAL USE

The notified modified alkyd in Crodakyd S99 will be manufactured locally. Crodakyd S99, the formulation containing the modified alkyd and 49-51% xylene, is blended with pigments, other additives and extended with additional aliphatic and aromatic solvents to produce industrial primers, surfacers and finish coats. The modified alkyd approximates to one third of the final paint formulations. The end result paint is then sold to paint applicators. The reformulation into these products is undertaken at the notifier's customers' paint manufacturing facilities. At the paint-applicating premises, the paint is applied to various items, such as filing cabinets, metal storage cabinets, tool boxes (etc.). The Crodakyd S99 producer believes that paint application by these firms will involve the use of automatic spray equipment, with effective fume extraction.

The anticipated manufacturing volumes of Crodakyd S99, containing the notified modified alkyd at 49-51%, are 100 tonnes/annum in the first year rising to 500 tonnes/annum after 5 years. Assuming a 50:50 mix of the polymer and xylene in the Crodakyd S99, then this translates into 50 tonnes/annum of the polymer in the first year, increasing to 250 tonnes/annum after 5 years.

6. OCCUPATIONAL EXPOSURE

The notified modified alkyd is manufactured locally. Occupational exposure can occur during manufacture, during reformulation and during application. Additionally, in the event of accidental spillage, exposure to warehousing and transport personnel could occur.

The notified modified alkyd is manufactured in a system where the less volatile/toxic components are added to the reaction vessel from drums. The other components are pumped direct to the sealed system. The notifier states that release to the atmosphere of these components and the solvent will not occur as the system is sealed. The notified modified alkyd is mixed with the solvent, xylene, to form the product Crodakyd S99. The solvent xylene has an exposure standard of TWA 80 ppm (350 mg/m³) (2). Approximately 20 personnel at the notifier's manufacturing facility are exposed during the manufacture of Crodakyd S99 for the periods stated

below. These staff are involved in the weighing out, sampling and packing of the formulation:

75 minutes/day once/month for the first year of manufacture

75 minutes/day five times/month after the fifth year of manufacture

The formulation containing the notified modified alkyd, Crodakyd S99, is blended at paint manufacturing facilities. The major operations where staff are exposed to the notified polymer include mixing, quality control and container filling. These operations are undertaken using exhaust ventilation. Worker exposure is estimated as follows:

Paint make-up, 3 employees, 3 hours/day

Quality control, 3 employees, 8 hours/day

Container filling, 3 employees, 8 hours/day

Occupational exposure to the final paint formulations (approximately one third consisting of the notified modified alkyd) will occur during application. The paint formulations will only be used for industrial application. Application will take place in spray booths with fume extraction systems and down draft ventilation.

7. PUBLIC EXPOSURE

The notified polymer will be manufactured as the styrenated product, Crodakyd S99, at the A.C. Hatrick Botany Bay plant. It is expected that volume sales of Crodakyd S99 will be 100 tonnes per annum in the first year and after 5 years will be 500 tonnes per annum. Crodakyd S99 will be manufactured in a sealed reactor, and then pumped to a holding tank for final adjustment prior to decanting to 200 L steel drums for storage. Crodakyd S99 will then be distributed by road to paint manufacturers. No public exposure is expected to occur during the manufacture, storage or distribution of the notified polymer.

Paints containing the notified polymer will be manufactured in mixers fitted with exhaust ventilation and then decanted to storage containers for storage prior to distribution to industrial paint applicators. Paint application will involve the use of automatic spray equipment in spray booths fitted with fume extraction systems. Given the notified polymer is not volatile, no public exposure is expected to occur during paint manufacture or during spray painting procedures.

Waste notified polymer will be sent to secured landfill and is not expected to lead to public exposure.

The manufactured paints containing the notified polymer will be used to paint metal fixtures (eg. filing cabinets, metal storage cabinets and tool boxes). Although, public contact with treated surfaces may occur, the polymer has a high NAMW (1586) and therefore, dermal absorption would not be expected to occur.

8. ENVIRONMENTAL EXPOSURE

Release

· ***Polymer manufacture***

Both the polymer and the Crodakyd S99 product is manufactured by the company in Australia, at the company's Botany (NSW) factory.

The polymer reactor is totally sealed, and the xylene is introduced last into it to produce the Crodakyd S99. Sampling of the polymer and the final product during manufacture and for final specification is carried out through approved sampling valves.

The company uses procedures outlined in the MSDS if there is a spillage on-site, depositing the spill in secure landfill in accordance with local, state and federal regulations. Filter bag residues would be disposed of similarly. There is no atmospheric monitoring for the polymer, as it is non-volatile.

Any excess Crodakyd S99 remaining after filtering into the drums (ie. part-drums) would be blended into the next batch.

The polymer/xylene mixture will be packed into sealed, steel 200 litre containers and stored at the company storage facilities (at ambient temperature) until delivery. The storage areas are at the Sydney factory, and in Brisbane, Melbourne, Adelaide and Perth. Hence some portion of the yearly manufacture would be transported by road from the factory to the various storage facilities. Each storage area is a facility approved for flammable liquids. The sealed drums are delivered to the paint manufacturers that are Hatrick's customers.

The company argues that there is minimal to zero release to the environment of either the polymer or the polymer/xylene product during their manufacture, and that any release in the manufacturing plant would be correctly captured and disposed of.

· ***Formulation of polymer into a paint product***

Exact details of the fomulators' process were not provided, but a schema was offered:

| | | | | |
|--|----------------------------|-------------------------|-------------------------------|--------------------------------------|
| Crodakyd S99 dispersed with pigments & other ingredients | Blending -----> in a mixer | Batch -----> adjust and | filtration -----> and filling | To warehouse -----> for distribution |
|--|----------------------------|-------------------------|-------------------------------|--------------------------------------|

The company believes that its paint-manufacturing customers would have filters or scrubbers with exhaust ventilation, to catch any Crodakyd S99 released to the air

during sampling and filling. As the polymer is non-volatile however, it is argued that any release would be the solvent (xylene) not the polymer. Further, manufacturing residues and wash solvent are recycled to be included in the next batch.

Hence the company believes there is zero waste production of polymer in this part of polymer's life cycle. Further, they imply that any release would be captured and disposed of correctly.

· ***Application of Crodakyd S99-based paint product***

Crodakyd S99 is not to be sold to the public, only to paint formulating companies, and indirectly to paint application companies. Hatrick believes that application of any paint product that contains Crodakyd S99 is done via automatic spray equipment in a spray booth with an effective fume extraction system. Further, that the paint application rooms would have down-draft ventilation.

Whilst acknowledging that 50% paint loss is possible in some painting facilities, the company believes that it would be considerably lower than this in the hands of skilled paint operators who wish to maximise paint use in economic terms (viz. minimise paint losses). Regardless of paint use efficiency, the company believes that all losses (overspray) would be retained within the factory confines. As well, before disposal, it would have cured to a very high molecular weight cross-linked polymer with no excess solvent, and so pose no environmental risk in secure landfill.

In short, unquantified release into paint shop confines, but capture of any release in filters/scrubbers (therefore no release to the general environment), and correct disposal of the captured release. The company believes that any residue in drums, or from cleaning of spray equipment or scrubbers, would be deposited in secure landfill, in accordance with local, state and federal regulations.

Assuming 75% spray efficiency in the paint application process, then there could be approximately 208 tonnes (25% of 833 tonnes) per annum of waste paint going to landfill, at the projected top-level sales of polymer (viz. 250 tonnes/year). This would contain about 62 tonnes of polymer (30% of 208), most likely in cured form.

Fate

The company states that under normal use, there will be no degradation products. The company also does not expect any monomer, additive or impurity to be lost by exudation or leaching of the polymer. Inspection of the structure and chemico-physical properties of the polymer support this. As well, the polymer would exist in landfill in a cured form.

Painted items would be cured, resulting in a polymer of very high molecular weight. This would be expected to be stable and pose no environmental risk.

9. EVALUATION OF TOXICOLOGICAL DATA

For a synthetic polymer with number average molecular weight (NAMW) > 1000, toxicology data is not required under the Act. None was provided by the notifier.

The notified polymer has a NAMW of >1000 and is therefore not expected to traverse biological membranes and constitute a toxicological hazard. Although the notified polymer contains a low level of a hazardous residual monomer and low levels of low molecular weight, no loss by exudation or leaching from the polymer is expected to occur and therefore, they are not expected to present a toxicological threat.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

As the synthetic polymer under assessment has a predominant molecular weight greater than 1000, then data on toxicology (Part C) is not required.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

Hazard from Use

From the scenarios presented for the three phases of the polymer's life (manufacture, formulation in paint and paint application), none of the polymer would be expected to be released to the environment in the first two phases.

The company expects most of the polymer will be cured onto items that are painted with Crodakyd S99 type paint.

They do not expect very much at all to be disposed of by landfill. The captured polymer (in filters etc.) would be expected to cure as a high molecular weight, cross-linked polymer which is insoluble and will not cross biological membranes.

Based on the assumptions in "Release" above, there could be 62 tonnes of cured polymer disposed to landfill, but no environmental hazard is expected from this, given the nature of the cured polymer.

Therefore, the use of Crodakyd S99 should cause no environmental impact, so long as it is used as stated.

Hazard from Manufacture, Handling and Disposal

The MSDS is satisfactory for handling, storage, transport and spill-control/disposal of the Crodakyd S99 product.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

Synthetic polymers of NAMW > 1000 as a rule tend to not be biologically active, for this reason toxicological data is not normally required as specified in the Act.

The notified modified alkyd will be manufactured locally but only sold as a commercial formulation containing in addition to the modified alkyd, 49-51% xylene. Exposure to xylene, not the notified modified alkyd, would be the primary concern associated with the industrial use and manufacture of Crodakyd S99. Xylene is moderately toxic via ingestion, dermal exposure and when inhaled, it is also a severe skin irritant. Safety measures associated with the formulation should be directed at preventing exposure via dermal or respiratory routes as ingestion is less likely to occur. During the manufacture, processing and reformulation of the notified chemical occupational exposure will be reduced as these processes either occur in closed systems, or if open, then exhaust ventilation is used. If exposure does occur during manufacture then appropriate safety clothing/devices should be readily available to minimise exposure to the formulation.

Potentially twenty employees will be exposed to the notified modified alkyd during manufacturing with a further nine being potentially exposed during reformulation. An unspecified number of employees will be exposed during application of the final paint formulations. The final formulations will be for industrial use only there will be no retail sale for domestic purposes. During application of the final formulations effective ventilation should be used or respiratory protection worn and dermal exposure minimised via the use of appropriate clothing. Although, public contact with painted surfaces containing the notified polymer may occur, the high NAMW for the polymer suggests that if contact were to occur, absorption is unlikely, and therefore there is negligible risk to public safety.

On the basis of an assessment of the information provided by the notifier the modified alkyd in Crodakyd S99 would be not be classified as hazardous according to the criteria of Worksafe Australia (1). However the formulation, Crodakyd S99, would be classified as hazardous on the basis of its xylene content.

13. RECOMMENDATIONS

To minimise occupational exposure to the modified alkyd in Crodakyd S99, the following guidelines and precautions should be observed:

If engineering controls and work practices are not sufficient to reduce exposure to the modified alkyd in the formulation Crodakyd S99 the following personal protective equipment should be used:

- . The appropriate respiratory device should be selected and used in accordance to Australian Standard/ New Zealand Standard (AS/ NZS) 1715 (3) and should conform to AS/NZS 1716 (4).
- . Eye protection (chemical goggles or face shields) should be selected and fitted in accordance to AS 1336 (5) and used in accordance to AS/NZS 1716 (6).
- . Industrial clothing must conform to the specifications detailed in AS2919 (7).
- . Impervious industrial gloves should conform to the standards detailed in AS 2161 (8).
- . a copy of the MSDS should be easily accessible to employees.
- . Implement good work practices to avoid the generation of dusts; avoid spillage.

14. MATERIAL SAFETY DATA SHEET

The MSDS for the modified alkyd in Crodakyd S99 was provided in a format similar to the Worksafe Australia format (9).

This MSDS was provided by A C Hatrick Chemicals Pty. Ltd as part of their notification statement. The accuracy of this information remains the responsibility of A C Hatrick Chemicals Pty. Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of the modified alkyd in Crodakyd S99 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, [NOHSC:1008(1994)], 1994. *Approved Criteria for Classifying Hazardous Substances*, AGPS, Canberra.
2. National Occupational Health and Safety Commission, [NOHSC:3008(1995)] & [NOHSC:1003(1995)], 1995. *Exposure standards for atmospheric contaminants in the occupational environment*, AGPS, Canberra.
3. 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.
4. Standards Australia/ Standards New Zealand, 1991. *Australian/New Zealand Standard 1716 - 1991 Respiratory Protective Devices*. Standards Association of Australia Publ., Sydney, Australia.
5. Standards Australia, 1994, *Australian Standard 1336-1994, Recommended Practices for Eye Protection in the Industrial Environment*, Standards Association of Australia Publ., Sydney, Australia.
6. 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.
7. Standards Australia, 1990 Australian Standard 3765 - 1990. *Clothing for Protection Against Chemical Hazards*, Part 1, *Protection against General or Specific Chemicals*; Part 2, *Limited Protection Against Specific Chemicals*, Standards Australia Publ., Sydney, Australia.
8. Standards Australia, 1978. *Australian Standard 2161-1978, Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)*, Standards Association of Australia Publ., Sydney, Australia.
9. National Occupational Health and Safety Commission, [NOHSC:2011(1994)], 1994. *National Code of Practice for the Preparation of Material Safety Data Sheets*, AGPS, Canberra.