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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

POLYMER IN KELSOL 3907-B2G-75

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Polymer in KELSOL 3907-B2G-75

1. APPLICANT

Quaker Chemical (Australasia) Pty Ltd of 8 Abbott Road SEVEN HILLS NSW 2147 has submitted a notification statement in support of their application for assessment of a synthetic polymer of low concern, Polymer in KELSOL 3907-B2G-75.

2. IDENTITY OF THE CHEMICAL

Polymer in KELSOL 3907-B2G-75 has been accepted as a Polymer of Low Concern according to the definition under the ACT, and is considered not to be hazardous according to NOHSC's Criteria based on the nature of the chemical and the data provided. Therefore the chemical name, CAS number, molecular and structural formulae, molecular weight and spectral data have been exempted from publication in the Full Public Report.

Trade Name:	KELSOL 3907-B2G-75 (containing > 60% the notified polymer)

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	amber solid, flexible
Boiling Point:	98-150°C (KELSOL 3907-B2G-75)
Specific Gravity:	1.025 (KELSOL 3907-B2G-75)
Vapour Pressure:	not determined
Water Solubility:	not determined but estimated to be less than 1 $mg.L^{-1}$
Partition Co-efficient (n-octanol/water):	not determined
Hydrolysis as a Function of pH:	not determined (see comments below)

Dissociation Constant:	the notified polymer contains free carboxylate groups (see comments below).
Flash Point:	32°C (KELSOL 3907-B2G-75)
Flammability Limits:	Lower Explosive Limit = 1.5% (KELSOL 3907-B2G-75)
Autoignition Temperature:	not determined
Explosive Properties:	solvent vapour may form an explosive mixture in air (KELSOL 3907-B2G-75)
Reactivity/Stability:	the notified polymer is a polyester and generally stable, however, the polymer may undergo hydrolysis under extreme temperature and pH conditions

Comments on Physico-Chemical Properties

The notification states that there may be some free carboxylate groups. Examination of the structure shows all of the trimellitic anhydride component (less than 10%) must contain one free carboxylic acid group since the other two are included in the bound structure. Given that the pKa of these groups should be similar to benzoic acid (pKa equal to 5.41) the notifier concludes that the level of ionisation will be low in the environmental pH range. However, it is expected that most of them will be ionised above pH 6.5. The notifier has indicated that water solubility will be less than 1 $mg.L^{-1}$ at pH 6 and that the polymer will not be soluble in water at pH greater than 6 without a cosolvent. Solubility will be higher at pH greater than 6 due to the presence of ionised carboxylate groups. The polymer is fully reacted and does not contain any reactive groups which are intended to undergo further reaction. The data provided are acceptable for a polymer of low concern.

5. USE, VOLUME AND FORMULATION

The imported product KELSOL 3907-B2G-75 containing greater than 60% of the notified polymer will be used as a major formulation component of a water based, emulsion, surface coating product for use on metal fence posts, pipes and tubes.

The notified polymer will not be manufactured in Australia. It will be imported into Australia as a component of the imported product KELSOL 3907-B2G-75 in 180 kg steel drums. Import volumes of the notified polymer will be 175 tonnes annually for the first five years.

KELSOL 3907-B2G-75 will be formulated in Australia to the final product for end uses. The final product contains 10 to 30% of the notified polymer or 30 to 60% of KELSOL 3907-B2G-75.

6. OCCUPATIONAL EXPOSURE

The notified polymer will be imported in 180 kg steel drums. Waterside workers, transport drivers and warehouse operators will only be exposed to the notified polymer in the event of an accident.

At the formulation site, the imported product containing the notified polymer will be transferred from the drums to a closed mixing vessel using pumps. The product will be blended with other chemicals in the mixing vessel, which is equipped with mechanical agitation and local exhaust ventilation. The final products will contain 10 to 30% notified polymer for the metallic post coating and the pipe and tube coating. They will be packed in 200 kg plastic-lined steel drums or 10 000 L bulk bins. Exposure of the workers at the formulation site is expected to be minimal considering the using of closed systems and ventilation.

Two methods will be used at different customer sites to apply the coating to the fence posts and the pipe and tube products.

One site will use a spray process. The formulated products (200 kg drums) will be pumped into a storage tank and then fed to the spray process. The entire process will be fully automated, enclosed and with local exhaust ventilation. Workers at the coating site could be exposed to the notified polymer during unloading to the storage tanks and cleaning/maintenance of the process equipment.

Another site will use a dip tank to apply the coating. The formulated products will be pumped into a storage tank and then fed to a dip tank (approximately 400 L). The entire process will be fully automated and local exhaust ventilation is positioned over the tank to vent any fumes. Unused coating material will be recycled. Again, workers at that coating site could be exposed to the notified polymer during unloading to the storage tanks and cleaning/maintenance of the process equipment.

7. PUBLIC EXPOSURE

KELSOL 3907-B2G-75 will be imported into Australia and transported to the formulation sites. Procedures set out in the Material Safety Data Sheet should (MSDS) minimize the potential for public exposure in the event of a spill during transportation.

Public exposure to the notified polymer resulting from the manufacture and application of these coatings is expected to be negligible.

There will be minimal waste generated from these processes. All effluent is to be treated in an on-site waste treatment plant. Any liquid material remaining will be disposed of to an Aqueous Waste Treatment Plant. Material obtained from dried

spills and leaks will be disposed of to landfill in accordance with Local and State regulations. Public exposure is expected to be negligible.

There may be public contact with the notified polymer in the form of plastic coatings made from the polymer. However, the polymer is a stable high molecular weight substance, and as such it is expected that it would be poorly absorbed across biological membranes. It will be strongly bound within the matrix of the coating material on the external surfaces of treated posts, pipes, tubes and strapping and so exposure is expected to be minimal.

8. ENVIRONMENTAL EXPOSURE

Release

The notifier estimates that during reformulation at the formulation site approximately 1% of the notified polymer, some 1 750 kg, will be lost due to factors such as spills, leaks and cleaning. All waste will be treated in an on-site waste treatment plant. This plant uses two dissolved air flotation (DAF) tanks plus a range of other waste water and sludge tanks where various chemicals, such as alum and caustic soda, are added to coagulate waste and adjust pH. Once the waste has been sufficiently treated it is discharged to sewer. Sludge scraped from the two DAF tanks is either further treated on-site or disposed of at an Aqueous Waste Treatment plant.

During the waste treatment process the effluent is initially adjusted to pH 2 to 4. At this pH level the polymer is insoluble and should be removed with sludge. Based on a 95% adsorption in sludge and hence 5% discharge from the waste water treatment plant, the daily effluent discharge of 300 000 L will contain 10 ppm of the notified polymer on the thirty days per year when reformulation is undertaken. The notified polymer adsorbed onto sludge, some 1 660 kg, will be disposed of to the Aqueous Waste Treatment Plant. Once empty, containers used to import the notified polymer will be high pressure rinsed with either water or caustic solution and the rinsate will be sent to the on-site waste water treatment plant. The drums will then be sent to a drum recycling facility.

The formulated product will be sent to treatment plants in 10 000 L bulk tanks and 200 kg drums. The 10 000 L containers will be dedicated vessels and will only be cleaned periodically with water or caustic solution. Any rinsate from the washing process will be sent to the formulator's waste water treatment plant. Any residual material remaining in the 200 kg drums will be allowed to cure. The plastic drum liner will then be disposed of to landfill and the drums will be sent to a drum recycler. At the sites where the formulated product is used to coat metal items, an automated spray process or a dip tank is used. Plastic sheeting is laid under the tank to catch any spills and leaks which occur during this process. Any spilt material dries rapidly and is said to auto-oxidize and cross-link to a high molecular weight insoluble polymer. The plastic sheeting is replaced daily and is disposed of to landfill. The notifier estimates that losses during application will be less than

0.5% and some 866 kg of the notified polymer will be deposited to landfill in the form of cured material.

Fate

In the case of accidental spillage, the polymer is expected to be adsorbed onto soil or, if a spill occurs to water, onto sediment. Waste from the formulation process will mostly be disposed of in sludge sent to the Aqueous Waste Treatment Plant with a small proportion entering the sewage system in effluent from the formulation plant. Cured waste from the coating process will be disposed of to landfill. Due to the anticipated negligible solubility of the polymer, leaching from landfill is highly unlikely with no movement from the landfill site expected.

The majority of the polymer is not expected to be released to the environment until it has been used as a corrosion preventative on various products and will then share the fate of these products. Biodegradation is unlikely. The high molecular weight of the substance also means that bioaccumulation is not likely to occur (1,2).

9. EVALUATION OF TOXICOLOGICAL DATA

There were no toxicity data for the notified polymer provided by the notifier. This is acceptable for a PLC submission according to the Act.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided which is acceptable for polymers of low concern with a NAMW greater than 1 000 according to the *Industrial Chemicals (Notification and Assessment) Act* (1989).

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The polymer is unlikely to present a hazard to the environment when it is used in coatings for metal fence posts, pipes and tubes. Coated items will be consigned to landfill or recycled at the end of their useful life. The environmental hazard from such exposure of cured coating is expected to be low.

Some 1 660 kg of the notified polymer will be disposed of in sludge from the water treatment plant at the manufacturing plant. This material is expected to be adsorbed to the sludge and both bioconcentration and leaching are considered to be unlikely to occur, due to the high molecular weight of the product and its insoluble nature.

Some 866 kg of the notified polymer will be deposited to landfill in the form of cured material as waste from the coating process. The majority of the notified polymer is not expected to be released to the environment until it has been fully

cured into a solid polymer matrix. When cured polymer is disposed of, either as a residue or as a coating, no hydrolysis, movement, leaching, biodegradation or bioaccumulation of the polymer is expected.

If any uncured polymer is disposed of to landfill it should remain immobile in the landfill due to the polymer's expected low solubility in water. The main environmental hazard would arise through spillage in transport accidents that may release quantities of the polymer to drains and waterways. However, the polymer is expected to sink to the sediments and remain immobile on the soil/sediment layer.

The low environmental exposure of the polymer as a result of the proposed use, together with its expected negligible environmental toxicity, indicate that the overall environmental hazard should be negligible.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

Polymer in KELSOL 3907-B2G-75

Polymer in KELSOL 3907-B2G-75 has been accepted as a synthetic polymer of low concern under section 23 for the purposes of section 24A of the Act. The polymer is considered of low hazard to human health.

Waterside workers, transport drivers and warehouse operators will only be exposed to the notified polymer in the event of an accident.

Exposure of the workers at the formulation site is expected to be minimal by the use of closed systems and local exhaust ventilation. The occupational health risk for formulation workers is expected to be low.

At coating sites, the coating process will be fully automated and local exhaust ventilation is positioned over the dip tanks to vent any fumes. Workers at the coating sites could be exposed to the notified polymer during unloading to the storage tanks and cleaning/maintenance of the process equipment. However, the health risk for these workers is also expected to be low due to the nature of the polymer and the low concentration of the notified polymer in the formulated products.

There is negligible potential for public exposure to the polymer arising from transportation, manufacture of the coating formulations and application to pipes, tubes, posts and strapping, and disposal. While there may be public contact with the notified chemical in the form of coated products, the polymer is unlikely to be absorbed through biological membranes.

KELSOL 3907-B2G-75

The imported product KELSOL 3907-B2G-75 contains a hazardous component, sec-butyl alcohol (10 to 30%). sec-Butyl alcohol is flammable and harmful by inhalation. It is contained in the NOHSC's List of Designated Hazardous Substances (3) and NOHSC has established an exposure standard (TWA, 100 ppm or 303 $mg.m^{-3}$) for sec-butyl alcohol (4). KELSOL 3907-B2G-75 will be classified as hazardous according to the NOHSC's criteria if the sec-butyl alcohol content is over 25% in the product.

13. RECOMMENDATIONS

To minimize occupational exposure to Polymer in KELSOL 3907-B2G-75, the following guidelines and precautions should be observed:

- Spillage of the notified chemical should be avoided, spillages should be cleaned up promptly with absorbents which should then be put into containers for disposal;
- Good personal hygiene should be practised to minimize the potential for ingestion;
- A copy of the MSDS should be easily accessible to employees.

The imported product KELSOL 3907-B2G-75 contains a hazardous component, sec-butyl alcohol. To minimize occupational exposure to KELSOL 3907-B2G-75, the following additional guidelines and precautions should be observed:

- Safety goggles should be selected and fitted in accordance with Australian Standard (AS) 1336 (5) to comply with Australian/New Zealand Standard (AS/NZS) 1337 (6);
- Industrial clothing should conform to the specifications detailed in AS 2919 (7) and AS 3765.1 (8);
- Impermeable gloves or mittens should conform to AS 2161 (9);
- All occupational footwear should conform to AS/NZS 2210 (10);
- the NOHSC Exposure Standard for sec-butyl alcohol should not be exceeded at the workplaces.

14. MATERIAL SAFETY DATA SHEET

The MSDS for KELSOL 3907-B2G-75 was provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (11).

This MSDS was provided by the applicant as part of the notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of the applicant.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Act, secondary notification of the notified chemical 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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2. Gobas, F.A.P.C., Opperhuizen, A. & Hutzinger, O. 1986*, Bioconcentration of hydrophobic chemicals in fish: relationship with membrane permeation, Environmental Toxicology and Chemistry* **5** 637-646.

3. National Occupational Health and Safety Commission 1994, *List of Designated Hazardous Substances* [NOHSC:10005(1994)], Australian Government Publishing Service Publ., Canberra.

4. National Occupational Health and Safety Commission 1995, 'Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment', [NOHSC: 1003(1995)], in *Exposure Standards for Atmospheric Contaminants in the Occupational Environment: Guidance Note and National Exposure Standards*, Australian Government Publishing Service Publ., Canberra.

5. Standards Australia 1994, Australian Standard 1336-1994, Eye protection in the Industrial Environment, Standards Association of Australia Publ., Sydney.

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

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

8. Standards Australia 1990, 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.

9. Standards Australia 1978, Australian Standard 2161-1978, Industrial Safety Gloves and Mittens (excluding electrical and medical gloves), Standards Association of Australia Publ., Sydney.

10. Standards Australia/Standards New Zealand 1994, Australian/New Zealand Standard 2210-1994, Occupational Protective Footwear, Standards Association of Australia Publ., Sydney, Standards Association of New Zealand Publ, Wellington.

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