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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

DARAN SL143

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

DARAN SL143

1. IMPORTERS

W R Grace Australia Ltd, 1126 Sydney Road, Fawkner, Victoria 3060.
Henkel Australia Pty Ltd, 135-141 Canterbury Road, Kilysth, Victoria 3137.

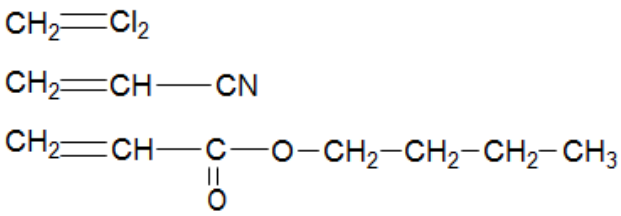
2. IDENTITY OF THE CHEMICAL

Trade name: DARAN SL143

Other names: Vinylidene chloride, butyl acrylate and acrylonitrile copolymer emulsion

Structural formula: The copolymer consists of the following monomers -

VINYLIDENE CHLORIDE ACRYLONITRILE BUTYL ACETATE



DARAN SL143 is considered to be non-hazardous. Therefore, its chemical name, Chemical Abstract Services Registry Number, molecular and structural formulae, molecular weight, import volume, weight percentage of monomers, additives and details of the coating process have been exempted from publication.

3. PHYSICAL AND CHEMICAL PROPERTIES

The polymer is manufactured as an aqueous based emulsion, DARAN SL143, and the physical and chemical properties mentioned below are mainly those of the emulsion.

At room temperature and atmospheric pressure, DARAN SL143 is a milky white emulsion with slight acrylic odour.

Freezing point: 0°C (DARAN SL143)

Boiling point: approximately 100°C (DARAN SL143)

Specific Gravity: 1.25 (DARAN SL143)

pH: 1.4 - 2.0 (DARAN SL143)

Water solubility: The polymer itself is insoluble in water, but the particles are completely miscible with water as their inherent hydrophobicity is modified by a protective surfactant layer.

Vapour pressure: for DARAN SL143 is as for water as the contribution from the polymer is negligible

Hydrolytic stability: Not applicable as the polymer is not water soluble. The notifier indicates that the latex is destabilised by strong bases, presumably because such reagents favour dehydrochlorination.

Partition coefficient: Not applicable as the polymer is (n-octanol/water) neither water soluble nor, to judge from its structure and size, fat soluble.

Soil adsorption-desorption: Not measured. The polymer would be expected to be immobile in soils.

Dissociation constant: Test not conducted as the polymer contains no dissociable groups.

Mean particle size: 0.11 µm

Flash Point: > 100°C, closed cup (DARAN SL143)

Explosive Properties: Non-explosive (DARAN SL143)

Thermal decomposition: hydrogen chloride and hydrogen cyanide may be released when dried product is exposed to high temperatures

Reactivity: DARAN SL143 is corrosive to common metals

Stability: DARAN SL143 is unstable to basic pH, UV light and heat

Spectral data: Infrared spectrum for DARAN SL143 was provided.

4. METHOD OF DETECTION AND DETERMINATION

The polymer and DARAN SL143 can be identified by Infrared spectroscopy.

5. PURITY OF THE CHEMICAL

DARAN SL143: DARAN SL143 is the reaction product of vinylidene chloride, butyl acrylate and acrylonitrile copolymer, water and additives. It contains approximately 54% by weight of polymer particles (ie 54% total solids).

Monomers:

. **Identity:** Vinylidene Chloride
Synonym: 1,1 dichloroethene
CAS No.: 75-35-4
Toxic properties: moderate acute oral toxicity (rat LD_{50}=200 mg/kg); very low inhalation toxicity (rat LC_{50}=6350 ppm/4H) (1).exposure standards(2):
TWA: 5 ppm
- STEL: 20 ppm

. **Identity:** Acrylonitrile
Synonym: 2-propenenitrile
CAS No.: 107-13-1
Toxic properties: moderate acute oral toxicity (rat LD_{50}=78 mg/kg); moderate inhalation toxicity (rat LC_{50}=425 ppm/4H); mild skin irritant (rabbit 500 mg); severe eye irritant (rabbit 20 mg) (1).exposure standards(2):
TWA: 2 ppm
Category 2 Carcinogen

. **Identity:** Butyl Acrylate
Synonym: 2-propenoic acid, butyl ester
CAS No.: 141-32-2
Toxic properties: low acute oral toxicity (rat LD_{50}=900mg/kg); very low inhalation toxicity (rat LC_{50}=2730 ppm/4H); mild skin irritant (rabbit 500 mg); mild eye irritant (rabbit=500 mg/24H) (1).exposure standards(2):
TWA: 10 ppm
Sensitiser

Maximum content of residual monomers in DARAN SL143: <.03%

6. REFORMULATION PROCESS

DARAN SL143 will be reformulated by the addition of water and pigments by Henkel Australia. DARAN SL143 will be imported in 200 L drums and transferred into bulk storage and settling tanks. It will be blended in batches with water and pigments in a dedicated blending vessel. The reformulated product, containing 60-70% DARAN SL143, will be packaged into drums for distribution to industrial use sites.

7. INDUSTRIAL USES

DARAN SL143 will be imported for industrial use as a protective coating.

8. OCCUPATIONAL EXPOSURE

8.1 Reformulation process

DARAN SL143 will be imported in 200 L sealed drums and worker exposure to the emulsion during transport and storage will be minimal except in the event of an accidental breakage.

DARAN SL143 will be reformulated in batches by Henkel Australia. The emulsion will be pumped from the drums into storage tanks using a positive displacement transfer pump. The storage tanks will be located remote from the mainstream daily plant activities. DARAN SL143 is then automatically control pumped into the dedicated blending tank, mixed with water and pigments and packed into 200 L drums. Fume extraction will be provided to the dedicated blending vessels and packaging areas and the extracted air passed through a wet packed scrubber prior to discharge into the atmosphere. Exposure of workers to DARAN SL143 during reformulation is expected to be low.

Annually the bulk storage and settling tank will be desludged (4 hours) and approximately 400 L per annum of material will be disposed of. Occasionally the dedicated mixing tank will require washing down and the wash water will be collected and used as make-up for the next mixing batch. Thus workers could be exposed to DARAN SL143 during cleaning of the tanks. Personal protective measures and good housekeeping practices should be observed by workers who may have direct contact with DARAN SL143.

8.2 Industrial use

Process workers will be involved in making up and maintaining the immersion baths of DARAN SL143 in coating plants. The formulated product is automatically transferred from the 200 L drums into the immersion tanks using transfer/metering pumps. Essentially, the process involves placing articles to be coated on jigs on a conveyor line which then automatically pass through the processes of cleaning, coating and curing. The articles are then manually removed from the conveyor line and packed. Low temperature curing is not expected to produce hydrogen chloride and hydrogen cyanide fumes. Worker exposure to DARAN SL143 during this process is expected to be minimal.

Customs inspectors and quality control chemists will occasionally take samples of DARAN SL143 and the formulated product for

analysis. These workers, and any process worker who may come into contact with DARAN SL143 and the formulated product, should observe personal protection measures and good housekeeping practices.

9. PUBLIC EXPOSURE

The potential for public exposure to DARAN SL143, and hence to the polymer, is expected to be low due to its manner of use and disposal. DARAN SL143 is manufactured outside Australia and will be imported in drums. Minimal public exposure is expected from the disposal of pH adjusted discharge from the reformulation and end user plants. Empty drums will be washed out with water and disposed of to a drum reconditioning dealer. Exposure to coated components may be widespread but the material will be in its cured state.

10. ENVIRONMENTAL EXPOSURE

As DARAN SL143 is imported as an aqueous emulsion, with discharge of unreacted material to sewer following use, environmental exposure will principally involve the aquatic compartment. The Melbourne Metropolitan Board of Works has indicated that the waste quality from coating plants would be acceptable to the sewerage system, after addition of alkali to raise the pH to between 6 and 10. The degree of removal during sewage treatment is unclear: while the physical state of the polymer is particulate, suggesting ready removal with sludge, its miscibility with water is likely to favour passage through treatment works into receiving waters, where it will remain in suspension because of its hydrophilic coating. As dehydrochlorination of the polymer destroys its hydrophilic coating, some removal appears likely under the alkaline conditions characteristic of sewage works, and polymer particles released to the environment can be expected to partition slowly to sediment.

11. EVALUATION OF TOXICOLOGICAL DATA

11.1 Absorption

The polymer in DARAN SL143 has a high molecular weight (>10,000) and is therefore unlikely to be absorbed across biological membranes such as the skin and the gastrointestinal tract (3). Molecular weight is one of the key factors which determines

absorption of a chemical by an organism. It is generally believed that as molecular weight increases, absorption decreases.

11.2 Acute Toxicity

Table 1: Summary of acute toxicity studies for DARAN SL143

Test	Species	Number animals	Outcome	Reference
Oral	Rat	3	LD_{50}>5000 mg/kg	6
Eye irritation	Rabbit	6	non-irritant	8
Skin irritation	Rabbit	1	slight irritant	6

11.2.1 Oral Toxicity

A single 5000 mg/kg dose of DARAN SL143 was administered by gavage to 3 male Fischer 344 rats. The rats were observed for 14 days post-treatment. No control animals were used in the study. No adverse effects were noted and body weights were unaffected. The animals were not necropsied. Due to the low pH (1.4-2) of the compound, it can be predicted to have corrosive properties (4 and 5) and pathological examination, particularly of the upper digestive tract, would have provided useful information. The extent to which the compound will affect the mucous membranes of the stomach, oesophagus and oral cavity are still unknown. The LD_{50} of DARAN SL143 is greater than 5000 mg/kg under the test conditions (6).

11.2.2 Eye Irritation

A 0.1 ml dose of DARAN SL143 was instilled into the left eye of six New Zealand White rabbits (3 females and 3 males). The right eye of each animal was not treated and served as a control. The eyes were observed at 24, 48 hours and 72 hours post-instillation and assessed according to the Draize scale for scoring ocular lesions (7). No ocular reactions were observed in any of the

animals. The results of this study indicate that DARAN SL143 is not an eye irritant in rabbits (8).

11.2.3 Skin Irritation

DARAN SL143 was applied to the ear, the shaved intact abdomen and the abraded abdomen of one male New Zealand rabbit. Ten 0.1 ml applications of the test material were made to the ear over 14 days and left uncovered. Ten 0.5 ml applications of the test material were applied to an area of shaved, intact abdomen over 14 days and covered by a cotton pad. Three similar applications were also made on an area of abraded, shaved abdomen for 3 consecutive days. Slight erythema of the ear was observed from days 7 to 10 and on intact abdominal skin on day 10. The results of the study indicate that DARAN SL143 is a slight skin irritant (6).

Current OECD guidelines (5) recommend the use of at least 3 animals for skin irritation tests. A more rigourous study would have provided better information on which to assess the skin irritation hazard of the chemical.

11.3 Overall Assessment of Toxicological Data

Results of toxicity studies indicate that DARAN SL143 has low acute oral toxicity in rats and is a non eye irritant and slight skin irritant in rabbits. The oral toxicity and skin irritation studies were not of high quality and lacked adequate animal numbers. However, overall the toxicological data indicates that DARAN SL143 is a non eye irritant and slight skin irritant.

The notifier states that degradation of DARAN SL143 during ageing may produce the following monomers: vinylidene chloride, acrylonitrile and butyl acrylate. Vinylidene chloride is considered as a CNS depressant in humans and repeated exposure can cause hepatic and renal dysfunction (9). Acrylonitrile produces respiratory and nervous system effects by inhalation in humans (10) and is considered as a probable carcinogen in humans by IARC (11). Butyl acrylate is an eye and mucous membrane irritant (12).

Melbourne Water has set the following acceptable levels: the pH of the waste must be in the range of 6 to 10 and with the following limits for the compounds: acrylonitrile 1 mg/L; vinylidene chloride 0.5 mg/L and butyl acrylate 1 mg/L.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The polymer has a high molecular weight and is therefore unlikely to cross biological membranes. The animal studies performed with DARAN SL143 indicate that the chemical is non irritating to the eye and is a slight skin irritant. DARAN SL143 consists of three monomers, vinylidene chloride, acrylonitrile and butyl acrylate. All three monomers are considered hazardous and have Australian exposure standards assigned to them (2). However, the percentage of residual monomers in concentrated DARAN SL143 is <.03% and thus should not pose a significant risk to workers. Occupational exposure to DARAN SL143 is expected to be low because of its use pattern. Personal protective measures and good housekeeping practices should be observed by workers who may have direct contact with DARAN SL143.

Degradation of DARAN SL143 during ageing may produce the monomers, vinylidene chloride, acrylonitrile and butyl acrylate and hydrogen chloride. The notifier states that the chemical will be imported in lots. DARAN SL143 should be used within its 9 months shelf life.

The potential for public exposure to DARAN SL143 is expected to be low due to its manner of use and disposal. Exposure to coated components may be widespread but the material will be in its cured state. Therefore, due to its low exposure, DARAN SL143 is unlikely to pose a significant health and safety hazard to the public.

13. ASSESSMENT OF ENVIRONMENTAL EFFECTS

Ecotoxicological testing is not required for high molecular weight polymers. Such large molecules generally do not exhibit toxic characteristics as they are not transported readily across biological membranes. Any environmental effects will be physical rather than chemical, eg deposition of polymer particles. However, as the polymer will be transported away from the point of discharge until dehydrochlorination destroys its hydrophilic coating, such deposition can be expected to be dispersed over a wide area.

14. ASSESSMENT OF ENVIRONMENTAL HAZARD

Assuming as a worst case that two coating plants each discharge 300 kg daily to metropolitan sewage works with a daily flow of 50 ML, the concentration entering receiving waters, if no removal occurs during sewage treatment, would be 12 ppm. In view of the polymer's dispersible properties, dilution in receiving waters should rapidly reduce this concentration to sub ppm levels, and significant accumulation of residues near the point of discharge is not expected. The total annual discharge of DARAN SL143, assuming daily release of 140-300 kg per plant and 200 days operation per year, would amount to between 84 and 180 tonnes, indicating that significant losses occur during coating processes.

While the predicted environmental concentration is relatively high in environmental terms, the predicted environmental hazard associated with the proposed use of DARAN SL143 is low as the chemical is a high molecular weight polymer with no obvious biological activity.

15. ASSESSMENT OF MATERIAL SAFETY DATA SHEETS

The Material Safety Data Sheet (MSDS) for DARAN SL143 is provided at Attachment 1. This MSDS was provided by WR Grace Australia Ltd as part of the notification statement. It is reproduced here as a matter of record. The accuracy of this information remains the responsibility of WR Grace Australia Ltd.

16. RECOMMENDATIONS FOR THE CONTROL OF PUBLIC AND WORKER EXPOSURE

Recommendations are based on the properties of the aqueous emulsion, DARAN SL143 the imported form of the polymer. Measures taken to control exposure to DARAN SL143 will minimise exposure to the polymer itself. To minimise public and worker exposure to DARAN SL143 the following guidelines and precautions should be observed:

. workers who may come into contact with DARAN SL143 should:

- wear appropriate gloves and goggles; and
- observe good personal hygiene practices.

- engineering control measures, such as local exhaust ventilation, should be employed in areas where DARAN SL143 will be mixed;

- good housekeeping should be maintained. Disposal should be in accordance with local regulations. Full personal protection should be worn in the event of a spillage or leakage. Large spills should be contained, neutralised and an absorbent, such as sand, should be used;

- a copy of the Material Safety Data Sheet should be readily accessible to employees.

17. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Industrial Chemicals (Notification and Assessment) Act 1989 (the Act), secondary notification of DARAN SL143 shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

18. REFERENCES

1. U.S National Institute for Occupational Safety and Health, *Registry of Toxic Effects of Chemical Substances (RTECS)*.

2. National Occupational Health and Safety Commission, *Exposure Standards for Atmospheric Contaminants in the Occupational Environment*, Australian Government Publishing Service, Canberra, 1991.

3. United States Federal Register, 40 CFR Part 723, *Premanufacture Notification Exemptions; Exemptions for Polymers*, 1984.

4. OECD Guidelines for Testing of Chemicals, TG 405 Acute Eye Irritation/Corrosion.

5. OECD Guidelines for Testing of Chemicals, TG 404 Acute Dermal Irritation/Corrosion.

6. *SARAN LATEX 143: Acute Toxicological Properties and Industrial Handling Hazards*, HET Report No. DR-0159-3642-(1). Data on file, DOW Chemical Company Ltd, (1982).

7. Draize, J.H., *Appraisal of the Safety of Chemicals in Food, Drugs and Cosmetics - Dermal Toxicity*, Association of Food and Drug Officials of the United States, Topeka, Kansas, 1965, pp 49-52.

8. Primary Eye Irritation Study, DARAN SL143, Toxikon Project 91-1644. Data on file, W R Grace (1991).

9. IARC Monographs v. 39, 1986.

10. IARC Monographs v. 19, 1979.

11. IARC Monographs Suppl 7, 1987.

12. *Compendium of Safety Data Sheets for Research and Industrial Chemicals*. Keith L.H. and Walters D.B. (eds) VCH Publishers Florida, 1985.