

File No: NA/236

Date: 10 May 1995

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

GRILESTA V76-40

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT**GRILESTA V76-40****1. APPLICANT**

Hofmann and Co (AUST) Pty Ltd of 51 Shearson Crescent, Mentone VIC 3194, have submitted a limited notification for the assessment of Grilesta V76-40.

2. IDENTITY OF THE CHEMICAL

Grilesta V76-40 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 have been exempted from publication in the Full Public Report and the Summary Report.

Trade name: Grilesta V76-40

Number-average molecular weight: 2030

Maximum percentage of low molecular weight species (molecular weight < 1000): 8.12%

Method of detection and determination:

Grilesta V76-40 may be detected by infrared spectrometry

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa: white, solid flakes

Odour: odourless

Melting Point: 80-85°C

Density: 1210 kg/m³

Vapour Pressure: not applicable

Water Solubility: less than 1 ppb

Partition Co-efficient (n-octanol/water) log P_{ow}: not applicable

Hydrolysis as a function of pH: not measurable due to water insolubility

Adsorption/Desorption: the substance is not expected to adsorb or desorb from solids

Dissociation Constant pK_a: not applicable

Flash Point: not applicable

Flammability Limits:	non-flammable
Decomposition Temperature:	>300°C
Decomposition Products:	water, carbon dioxide and carbon monoxide
Autoignition Temperature:	>400°C
Explosive Properties:	not explosive
Reactivity/Stability:	not chemically unstable or reactive
Particle size distribution:	range: 5-10mm

Comments on Physico-Chemical Properties:

The lack of data on the polymer is due to the fact that it is of high number-average molecular weight and is a fine, inert powder which means that many of the tests are not applicable.

No data were given for the melting point. The polymer was found to soften and flow over a temperature range of 80-85°C.

No vapour pressure tests were conducted as the material is a high weight molecular solid. This is acceptable.

Water solubility tests were not conducted on the grounds that normal analytical tests are not suitable for detection of extremely low concentrations of polymers such as polyester resins in water. In addition, literature references were provided which indicate that this class of polymer exhibits low water solubility. Literature support was also provided for the claim that the absence of hydrophilic side groups will serve to further decrease the solubility. This is acceptable.

No data on hydrolysis were provided on the grounds that the low water solubility would preclude its measurement. Although the polymer contains a number of ester linkages which mean that hydrolysis is theoretically possible, the low solubility means that in practice hydrolysis is unlikely under environmentally relevant conditions.

Determination of partition coefficient (n-octanol/water) was not conducted on the grounds that Grilesta V76-40 has a low water solubility. This is acceptable. The high molecular weight of the substance is likely to prevent it from crossing biological membranes, although some of the low molecular weight material may do so.

Adsorption/desorption data were not provided on the ground that the low water solubility of the notified substance means that it would not be expected to adsorb to soils or to desorb from them. Polyester resins of this type may be expected to be immobile within the soil.

No data on the dissociation constant of the notified substance were supplied, on the grounds that the low water solubility meant that tests used to evaluate this property are not able to be carried out. A very low percentage of free carboxylic acid groups with typical acidity may be expected.

4. PURITY OF THE CHEMICAL

Degree of purity :	>99.9%
Toxic or hazardous impurities:	none
Non-hazardous impurities (> 1% by weight):	none
Maximum content of residual monomers:	< 0.01% for each monomer
Additives/Adjuvants:	none

5. INDUSTRIAL USE

Grilesta V76-40 is mixed with stabilisers, pigments and crosslinking agents after which the ingredients are melted, cooled, chipped and ground to form a powder coating. The powder coating is electrostatically applied to steel products the heating of which causes the formation of a paint film.

6. OCCUPATIONAL EXPOSURE

The estimated quantity of the polymer to be imported during the first 5 years of importation is approximately 100 tonnes per year.

Grilesta V76-40 will be imported in 25 kg polyethylene bags. Powder coating formulations containing Grilesta V76-40 will be supplied in plastic lined cardboard boxes. During storage and handling, exposure is only expected to occur in the event of an accidental spill.

Workers will be exposed to the chemical in the following way:

During formulation of the powder coating, workers may be exposed to Grilesta V76-40 in flake or powder form. These workers are involved in weighing the raw material, mixing the compounds, chipping and grinding the compounded material and packaging the powder.

Quality control workers will take samples of the powder coating mixture in flake or powder form and carry out test spraying. Most quality control work is carried out in spray booths with external exhausts and quality control workers wear dust masks or other respiratory protection.

Research and development workers handle dry, raw materials, homogenous melt mix or final product for the purposes of laboratory tests and investigations. Work is carried out in laboratories with air extraction.

Maintenance workers are involved in repairing machinery or equipment that may have residues of the components of the powder coating product or residues of Grilesta V76-40.

Applicators of the powder coatings may be exposed during the preparation of spray booths for spraying and cleaning of equipment.

Administration workers may be incidentally exposed if they spend some time in the production area.

A total of 45 workers will be involved in the powder coating formulations, quality control, research and development, maintenance and production administration. Of these 45 workers, 22 will be involved in powder coating formulations. There will be 4 workers involved in quality control and 4 workers involved in research and development. One full-time worker will be involved in maintenance and 6-10 workers as required. Production administration will involve another 4 workers.

7. PUBLIC EXPOSURE

The potential for public exposure to the notified polymer is expected to be negligible. The powder coatings are intended for industrial application only in closed spray booths. Once applied and cured, the powder coatings become an inert polymer film. In this form the notified polymer is not bioavailable.

The notifier has indicated that disposal of solid waste generated at powder coating plants are expected to be via landfill. Water contaminated with the polymer from these plants passes through a settling tank prior to release to sewer. Estimated total solid content that passes to sewer after settlement is approximately 1 kg in a 24 hour period. The proportion of the notified polymer in this waste is estimated to be approximately 3% initially, increasing to as high as 50% as production of products containing the notified polymer increases.

8. ENVIRONMENTAL EXPOSURE

. Release

Release of the notified substance may occur at several stages of the formulation process. The powder coatings are manufactured in a closed mixer. Granular Grilesta V76-40 and various other additives are transferred to the mixer using scoops or by pouring. Accidental spills at this stage would be controlled by on-site bunding. Negligible release is expected to the atmosphere due to the involatile nature of the substance.

The mixed dry ingredients are transferred to a compounding extruder for melt mixing, and extrusion at approximately 120°C. Chipping, grinding, packaging of the raw powder coatings, cleaning of vessels containing residual Grilesta V76-40 and quality control sampling may also lead to release. The notifier estimates that maximum wastes generated during the production of powder coatings will be in the range of 2-5% of the total product (ie. a maximum of 2-5 tonnes per annum).

Dust removed from the formulation area will pass through filters before release. Initially, 3% of Grilesta V76-40 is expected to occur in the dust, but the proportion is expected to rise to as much as 50% at full production. This equates to approximately 0.85 kg per day or 311 kg per year.

Solids are collected from spills during formulation, and water from cleanup of spills and rinsing of equipment etc. are expected to pass through settlement tanks prior to disposal to landfill sites. Again, such spills will contain between 3 to 50% of Grilesta V76-40, and are expected to total 1 kg per day (or 365 kg per year).

Thus a total of approximately 700 kg of Grilesta V76-40 may be expected to pass to landfill sites as a result of one years formulation at peak production levels.

Grilesta V76-40 will be used as a polyester resin for exterior powder coatings. The powder coatings are expected to be used by approximately 500 customers following formulation and will be applied to steel products using electrostatic powder guns in spray

booths. Coated materials will be heat cured in circulating ovens. Industrial use only of these coatings is envisaged. Dust created during spraying will be removed from booths using air extraction systems equipped with filters. Although estimates of the amounts of wastes to be collected by air filtration were not supplied by the notifier, it has been estimated (1) that, with proper recycling of captured materials on filters, efficiency of use may reach 99%.

Residual powder coatings in booths and on application equipment will be removed using vacuum, wet mopping, scrubbing or other procedures. Wastes so collected will be sent to landfill sites. Any water containing wastes will pass through settlement tanks prior to release to sewers. Sludges from settlement tanks will also be placed in landfill sites. Although the notifier has not provided any estimates of amounts of wastes to be produced as a result of application of the powder coatings, a similar submission for a closely related substance imported in identical quantities stated that an estimated 2000 kg per year of powder coating wastes per year would be sent to landfill sites. This estimate of waste as a result of normal use will be used for the current submission.

. Fate

While no specific examination was made of the degradation products of the notified substance, degradation, decomposition and/or depolymerisation may be expected under the following conditions: if the polyester copolymer was heated above 300°C and in the event of a fire. Following heating above 300°C water, carbon dioxide and carbon monoxide are expected to form. If combusted, the polyester copolymer is expected to produce carbon and hydrogen oxides, and incomplete combustion may also yield monomers.

Solid wastes placed in landfill sites should not leach due to low water solubility of the polymer. The polymer has ester linkages so that hydrolysis is possible, but this should not occur under environmentally relevant conditions.

Use of coated products is expected to produce chips and dusting of the coatings as a result of normal wear and tear, but such releases would be diffuse and are expected to be inert in the environment. Recycling of coated metal products will involve the initial smelting, with the powder coatings expected to produce pyrolysis products as outlined above.

9. EVALUATION OF TOXICOLOGICAL DATA

Grilesta V76-40 is a polymer of number-average molecular weight (NAMW) >1000. Under the *Industrial Chemicals (Notification and Assessment) Act 1989* no toxicity tests are required.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided, which is acceptable for polymers of NAMW > 1000, according to the Act . The high molecular weight, and proposed manner of use of the notified substance should minimise the exposure of organisms to the notified substance.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The polymer is unlikely to present a hazard to the environment when it is incorporated into powder coatings and applied to end use products. The heat curing as a part of normal application procedures should further ensure that the polymer will remain inert in the environment.

As a worst case example, up to 7.5 kg of the polymer will be expected to be released into the environment per day. All of this should go to landfill, either directly as a result of cleaning up formulation spills and equipment, or following clean-up of wastes after use and application to end use products. Virtually none of this waste would be expected to move from landfill sites due to the insoluble nature of the notified substance. In addition, the high molecular weight of the polymer and its inert state on release following curing should minimise any risk to organisms. Other releases, in the forms of chips and flakes of the cured polymer, will be diffuse and are unlikely to pose an environmental hazard.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified chemical is a high molecular weight polymer with a number-average molecular weight > 1000 and is therefore unlikely to cross biological membranes and be of toxicological concern. The purity of the notified polymer has been given as > 99.9%, with no detectable levels of residual monomers (detection limit of 100 ppm). The levels of low molecular weight species (approximately 8%) are unlikely to render the polymer a health hazard given the toxicological profile of the two monomers which comprise about 90% of the polymer.

Grilesta V76-40 is imported in the form of solid flakes of 5-10 mm which minimises the likelihood of dust formation. The powder coating formulations containing Grilesta V76-40 are in the form of fine dust and 90% of particles are less than 100 µm. If a dust cloud is generated the dust may ignite or explode.

The notifier indicates that Grilesta V76-40 has been in use in Europe since 1992 and no adverse effects have been observed in workers exposed to it. No epidemiological studies are available.

Exposure to dust may result during weighing, transferring, chipping, grinding, testing and packaging of chemical. However, as local exhaust ventilation and enclosed systems are employed the level of exposure is expected to be low.

Application of the powder coatings containing the notified polymer by end users is normally expected to occur in properly ventilated spray booths to ensure a good finish on the painted articles. However, significant exposure to dust is possible depending on the exact nature of the booths employed.

The potential for public exposure to the notified polymer is expected to be negligible.

Significant exposure to the notified polymer from accidental spillage during transport is not anticipated, as it will be supplied and transported in polyethylene bags packed on wooden pallets and enclosed by polyethylene shrink wrap and the dry solid flakes are easy to sweep up and collect manually or mechanically. Its lack of water solubility would prevent it being dispersed in water. If heated above about 300°C (as may occur in a fire), it breaks down to water, carbon dioxide and carbon monoxide which only present significant health hazards in an enclosed space.

The risk of adverse occupational or public health effects occurring as a result of transport, storage or use of the notified chemical or use of products containing the notified chemical is expected to be minimal under normal conditions.

13. RECOMMENDATIONS

To minimise occupational exposure to Grilesta V76-40 the following guidelines and precautions should be observed:

- . generation of a dust cloud during formulation of powder coatings should be avoided;
- . local exhaust ventilation should be used to control dust when formulating powder coatings;
- . precautions for organic dust and the Worksafe Australia exposure standard for nuisance dust ($10\text{mg}/\text{m}^3$ (2)) should be observed;
- . if engineering controls and work practices do not sufficiently reduce exposure to a safe level then the following personal protective equipment should be used:
 - workers exposed to dust should wear a dust mask conforming to Australian Standards AS 1715-1991 and AS 1716 (3,4);
 - goggles conforming to Australian Standards AS 1336 and AS 1337 (5,6); and
 - impermeable gloves conforming to Australian Standard AS 2161 (7).
- . the Material Safety Data Sheet (MSDS) for Grilesta V76-40 should be available to all workers using the chemical.

14. MATERIAL SAFETY DATA SHEET

The MSDS for Grilesta V76-40 was provided in Worksafe Australia format (8). This MSDS was provided by Hofmann & Co (Aust) 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 Hofmann & Co (Aust) Pty Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of Grilesta V76-40 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. Randall, P. M., 1992, 'Pollution prevention methods in the surface coating industry', *Journal of Hazardous Materials*, **29**, 275-295.
2. National Occupational Health and Safety Commission, 1991, 'Exposure Standards for Atmospheric Contaminants in the Occupational Environment', 2nd Edition, Australian Government Publishing Service Publ., Canberra, Australia.
3. Standards Australia, 1991, Australian Standard 1715-1991 'Selection, Use and Maintenance of Respiratory Protective Devices', Standards Association of Australia Publ., Sydney, Australia.
4. Standards Australia, 1991, Australian Standard 1716-1991 'Respiratory Protective Devices', Standards Association of Australia Publ., Sydney, Australia.
5. Standards Australia, 1982, Australian Standard 1336-1982 'Recommended Practices for Eye Protection in the Industrial Environment', Standards Association of Australia Publ., Sydney, Australia.
6. Standards Australia, 1984, Australian Standard 1337-1984 'Eye Protectors for Industrial Applications', Standards Association of Australia Publ., Sydney, Australia.
7. Standards Australia, 1978, Australian Standard 2161-1978, 'Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)', Standards Association of Australia Publ., Sydney, Australia.
8. National Occupational Health and Safety Commission, 1990. , 'Guidance Note for the Completion of a Material Safety Data Sheet', 2nd. edition, AGPS, Canberra , Australia.¹

¹ This Guidance Note, to which an MSDS must conform in accordance with the *Act*, has been superseded by Worksafe Australia's National Code of Practice for the Preparation of Material Safety Data Sheets (March 1994) published by the Australian Government Publishing Service.