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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

QAVR

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

QAVR

1. APPLICANT(S)

Ciba-Geigy Australia Limited, 140 Bungaree Road, Pendle Hill, NSW 2145.

2. IDENTITY OF THE CHEMICAL

Based on the nature of the chemical and the data provided, QAVR is not considered to be hazardous. Therefore, the details of chemical name, molecular and structural formulae, spectral data, impurities, appearance, exact use and import volume, have been exempted from publication in the Full Public Report.

Trade name(s): QAVR

Molecular weight: 420

Method of detection and determination:

. UV-Vis Absorption Spectroscopy and Nuclear Magnetic Resonance Spectroscopy

3. PHYSICAL AND CHEMICAL PROPERTIES

Odour: Not identified.

Melting Point: > 300°C.

Specific Gravity 1.37 + 0.02.

Vapour Pressure: Not determined.

Water Solubility:	< 0.0003 g/L at 20°C (purified substance). < 0.0001 g/l at 20°C (technical quality).
Fat Solubility:	Not determined.
Partition Co-efficient (n-octanol/water) log $P_{O/W}$:	5.76 at 25.0 + 0.2°C (calculated).
Hydrolysis as a function of pH:	Not determined.
Adsorption/Desorption:	Not determined.
Dissociation Constant pKa:	≃ 3 (pyrazole). ~ 0.3 (NH).
Flash Point:	Not determined.
Flammability Limits:	Not determined; could form flammable dust clouds with finely articulated pigments.
Combustion Products:	Not determined.
Pyrolysis Products:	Not determined.
Decomposition Temperature:	> 300°C.
Decomposition Products:	Not determined.
Autoignition Temperature:	260°C.
Explosive Properties:	Not explosive under the influence of a flame; determined to be less sensitive to shocks and friction than nitrobenzene; capable of a dust explosion with finely particulated pigments.

Reactivity/Stability:	Not reactive; weakly oxidising, oxidising rate of test substance: 1.7 mM/s and oxidising rate of reference mixture:3.2 mM/s.
Particle size distribution:	Range 13.7% < 4 µm; 86.3% < 400 µm. (powder)

Comments on physico-chemical properties:

No data were provided for hydrolysis on the grounds that the test could not be performed on the new substance due to low water solubility, and lack of sufficiently sensitive analytical methods. QAVR is unlikely to be readily degraded by hydrolysis under environmental conditions because of limited water solubility and lack of hydrolysable groups.

No data was provided for the adsorption/desorption potential of QAVR on the grounds of its low water solubility. CEPA notes that QAVR's partition coefficient indicates it has a high adsorption potential (1).

As the notified substance has a very low water solubility, an experimental determination of the dissociation constant was not possible. The dissociation constant is an estimation by the company based on the functional groups of the notified chemical.

4. PURITY OF THE CHEMICAL

Degree of purity :	93.5% ±3%
Toxic or hazardous impurities:	Not present
Non-hazardous impurities:	< 6.5% by weight (mean)
Additive(s)/Adjuvant(s):	None

5. INDUSTRIAL USE

QAVR is an aromatic acridone used in paint. QAVR will be imported into Australia by the applicant as an ingredient of a product

containing quinacridone pigments in a powder form. The final concentration of the notified chemical in the product will be ≤ 5%. Fifteen industrial establishments will be using this product in Australia. It is expected that 2 to 3 of the larger establishments would account for the bulk usage, whilst the smaller establishments would each handle less than 1 kg per year of QAVR.

The projected imported volume in the first three years is less than one tonne per annum.

QAVR has been notified in Germany and the Netherlands and is being notified in: United Kingdom; Italy; Belgium; France; Spain; Portugal; Finland; Canada; Korea; and Japan.

6. OCCUPATIONAL EXPOSURE

Occupational exposure to QAVR is possible during:

. weighing, batching and mixing of products containing QAVR in paint manufacture; and

. spray painting of automotive parts.

Batching operations will include weighing the powdered product and adding it to the blending vessel where it is mixed with the resin solution.

During routine operations inhalation, skin and eye contact are all possible routes of exposure to the chemical.

During use of the products containing the notified chemical, the exposure to the chemical is low due to the low concentration of the chemical (< 5%) in the formulated product.

7. PUBLIC EXPOSURE

The public will be exposed to the notified chemical in dried and cured paint on motor vehicles, where the notified chemical will be embedded/encapsulated by the resin of the paint. Motor vehicles will contain approximately 10 g of the notified chemical per vehicle. Polishing or cutting back of car finishes by the

public will be performed infrequently. As a result, potential public exposure to the notified chemical is anticipated to be low.

8. ENVIRONMENTAL EXPOSURE

. Release

The notifier states that practically no waste is generated during the incorporation of QAVR into formulated products (paints). The pigments which are treated with QAVR are very expensive. One kilogram of such a pigment, costing $ 150-200 contains approximately 0.04 kg QAVR. Paint manufacturers will ensure, for economic reasons, that the losses incurred will be minimal, and hence the release to the environment (air and water) will be minimal during the manufacture of paints.

It is estimated that negligible amounts (< 0.1 kg/month) of QAVR will be released to the environment (air and water) during paint manufacture. Dust collectors/air filters will limit the release into the air, whilst filtration/sedimentation will minimise the release into the waterways.

After incorporation and dispersion of the pigment into the paint, QAVR will be embedded/encapsulated by the resin of the paint and the only possible opportunities for its entry into the environment would be:

(a) During application, eg. emissions into the air during spray painting of automotive paints. As such, emissions usually contain a high percentage of solvents and other volatile paint components, they are generally required to be scrubbed before release to the environment. The concentration of quinacridone pigments being used in such paints depends on the specific shade, but is typically less than 7%. This is equivalent to < 0.3% of QAVR in the paint. If we assume total emission of the paint to the environment, the maximum percentage QAVR emitted would be less than 0.3%. In spray painting typically 50% is wasted and is land filled. In this case this would mean ~0.2 kg QAVR per annum.

(b) When the painted article is discarded to waste, eg by incineration of the coating by metal re-cycling operations or by landfill. The leachability to groundwater would be

negligible due to the low solubility of QAVR. Products of incomplete combustion are not considered problematic because of the QAVR's composition. The notifier estimates that on a typical motor vehicle the amount of top coat is less than ~2 kg of coating, containing less than an estimated 0.01 kg of QAVR per vehicle.

(c) During weathering of the paint. Surface coatings (automotive paints) are formulated to be resistant against breakdown by light and weather, and any release of the chemical QAVR by erosion of the paint film would be very gradual and diffuse. As the total amount of embedded QAVR is estimated to be less than 0.01 kg per vehicle, such a release to the environment would be considered to be negligible and insignificant. This situation applies to the polishing and cutting back of car finishes by members of the public.

. **Fate**

Any QAVR that enters the sewage system is likely to become adsorbed to suspended matter and become associated with sludge. The notified substance is unlikely to be readily biodegradable or hydrolyse under aerobic conditions by reason of its structure and required stability in use properties. Any polymer that remains in treated waste water and enters receiving waters is unlikely to be degraded. Its expected fate would be sorption and precipitation in sediment.

When wastes containing QAVR are sent to land fill, QAVR is unlikely to leach due to its low water solubility and expected adsorption to soil.

Incineration of wastes containing QAVR is likely to produce oxides of carbon, hydrogen and nitrogen.

. **Bioaccumulation**

QAVR's low water solubility, relatively high Pow, and lack of ready biodegradability, indicates it has the potential to bioaccumulate. However, tests have shown that quinacridone do not bioaccumulate in fish. The reason is the very limited fat (lipid) storage potential of these pigments indicated by their low solubilities in n-octanal, and their large molecular size (2).

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicology data are required under the *Industrial Chemicals (Notification and Assessment) Act 1989* (the Act) for chemicals imported < 1 tonne per year. However, the following studies were carried out on QAVR and are reported here.

9.1 Acute Toxicity

Table 1 Summary of the acute toxicity of QAVR

Test	Species	Outcome	Reference
Oral	rat	LD_{50}: >2000 mg/kg	(3)
Dermal	rat	LD_{50} >2000 mg/kg	(4)
Skin irritation	rabbit	non-irritant	(5)
Eye irritant	rabbit (6)	slight irritant	
Skin sensitisation	guinea pig (7)	non-sensitising	

9.1.1 Oral Toxicity (3)

This study was carried out according to OECD Guidelines for Testing of Chemicals No: 401.

A single dose of 2000 mg/kg of QAVR in 0.1% aqueous polysorbate 80 containing 0.5% carboxymethylcellulose, 10 ml/kg was administered by gavage to 10 (SPF) albino rats (five males and five females).

The animals were observed for 14 days. No deaths or body weight effects were noted during the study. In all animals dyspnea was

observed for up to 5 hours after administration, hunched posture for up to one day and piloerection for up to 2 days after dosing. No gross changes were observed at necropsy.

The results of this study indicate an oral LD_{50} of >2000 mg/kg for QAVR in male and female rats.

9.1.2 Dermal Toxicity (4)

This study was carried out in accordance with OECD Guidelines for Testing of Chemicals No:402.

A single dose of 2000 mg/kg of QAVR in 0.1% (w/v) aqueous polysorbate 80 containing 0.5% (w/v) carboxymethylcellulose, 4 ml/kg was administered by occlusive application to the shaved backs of 10 (SPF) albino rats (five males and five females) for 24 hours.

The animals were observed for 14 days. No deaths or body weight effects were observed during the study. In all animals slight piloerection and slight erythema (which could be attributed to dark red colour of the test substance), were observed on day 1.

The results of this study indicate a dermal LD_{50} of >2000 mg/kg for QAVR in male and female rats.

9.1.3 Skin Irritation (5)

This study was carried out in accordance with OECD Guidelines for Testing of Chemicals No:404.

A single dose of 0.5 g of QAVR moistened with 0.5% (w/v) carboxymethylcellulose in 0.1% (w/v) aqueous polysorbate 80 was administered by occlusive application to the shaved right flank of three male New Zealand White albino rabbits for 4 hours. A control with 0.5% (w/v) carboxymethylcellulose in 0.1% (w/v) aqueous polysorbate 80 was administered by occlusive application to the shaved contralateral flank of each rabbit for 4 hours. The site of application was examined 1, 24, 48, and 72 hours after removal of the dressing. Skin reactions were assessed according to OECD guide-line scoring system.

There were no signs of erythema or oedema in any of the animals. The staining of the test application sites (due to the dark red

test substance), which was apparent from 60 minutes after the removal of the dressings, could have obscured any possible erythema.

Results of this study indicate that QAVR is not a severe or moderate skin irritant, but the red staining by the test substance at the concentration tested may have masked slight irritating properties.

9.1.4 Eye Irritation (6)

This study was carried out in accordance with OECD Guidelines for Testing of Chemicals No:405.

Three female New Zealand White albino rabbits were used in the study. A single dose of 0.1 ml (62 mg) of QAVR was instilled into the conjunctival sac of the left eye of one rabbit. The other eye which remained untreated, served as the control. Occular reactions were evaluated at 1, 24, 48 and 72 hours post-exposure and scored according to the OECD guide-line scoring system for conjunctival redness and chemosis, damage to the iris, and corneal opacity.

All three rabbits showed slight conjunctival erythema and chemosis one hour after treatment. This erythema had diminished by 48 hours in all animals (the dark red colour of the test substance might have contributed to the redness), chemosis diminished by 24 hours in one rabbit and by 48 hours in the other 2 rabbits. There were no corneal or iridial effects in any of the three treated eyes.

Results of this study indicate that QAVR powder is a slight eye irritant at the concentration tested.

9.1.5 Skin Sensitisation (7)

This study was carried out in accordance with OECD Guidelines for Testing of Chemicals No:406.

The maximisation test (6) was used. Skin reactions were assessed according to a four point scale. The sensitivity of the strain of guinea pig used in this study was periodically tested with a known skin sensitiser, potassium-dichromate. Positive sensitisation responses were observed in the animals tested.

Preliminary study

The dose level for intradermal injection in the main study was 5% QAVR in 20% propylene glycol and 20% physiological saline. This concentration was selected on the basis that it was easy to inject and was well tolerated.

To determine the dose level for topical induction in the main study, 1, 5, 10 and 30% concentrations of QAVR in vaseline was administered to separate animals. As there was no evidence of erythema, the dose level selected for topical induction was 30% QAVR.

For the topical challenge in the main study, 10% QAVR in vaseline was chosen as the subirritant application on the basis that a higher concentration might lead to nonspecific reactions in adjuvant treated animals (8).

Induction and Challenge Study

Thirty Pirbright White strain guinea pigs, 20 test (10 males and 10 females) and 10 control (5 males and 5 females) were used.

Three pairs of injections of: Freund's Complete Adjuvant and saline mixture 1:1 (v/v); a 5% of the test substance in 20% propylene glycol and 80% physiological saline (w/v); and a 20% of the test substance in a 1:1 preparation of Freund's Complete Adjuvant and saline mixture (w/v), (0.1 ml per injection) were made simultaneously into the shaved neck of the test animals. One week later, 24 hours after pretreatment with 10% sodium lauryl sulphate, a single dose of 30% w/w of the test substance in vaseline was administered by occlusive application to the neck area of each test animal for 48 hours. Control animals were similarly induced but without the use of the test substance.

Four weeks after the inductions, both the test and control animals were challenged with a single dose of 10% of the test substance in vaseline (w/w) and the vehicle alone by occlusive application for 24 hours on different sites on the flanks of the animals.

Under the experimental conditions employed, one of the female animals of the test group showed very slight erythema at 24 and 48 hours after removal of the dressings. Gain in bodyweight was unaffected in all animals.

The results of this study indicate that QAVR is not a skin sensitiser in guinea pigs at the concentrations tested.

9.4 Overall Assessment of Toxicological Data

QAVR has low acute oral and dermal toxicity (oral LD_{50} in rats: >2000 mg/kg; dermal LD_{50} in rats: >2000 mg/kg). It is non-irritating to the skin of rabbits, a slight eye irritant and a non skin sensitiser.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

QAVR is a limited volume chemical substance. Therefore it is not a requirement that environmental effect studies are submitted according to the Act. However, a study on the immobilisation of *daphnia magna* by QAVR has been provided (OECD TG 202).

The results of the study was an EC50 (48h) > 100 mg L^{-1}. Concentrations tested all exceeded the aqueous solubility of QAVR and undissolved material was observed throughout in all solutions. Although the actual concentrations are unclear, *Daphnia* are unlikely to suffer acute effects up to the limit of solubility of QAVR.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The amount of QAVR that may enter the environment from the paint formulation and spray painting process is likely to be minimal, as dust collectors/air filters will limit emissions into the air, whilst filtration/sedimentation will reduce emissions into the waterways. Waste QAVR that enters the sewer is likely to adsorbed to suspended matter and become associated with sludge at the sewerage treatment plant. Any polymer that remains in treated waste water and enters receiving waters is likely to partition to the sediment and is unlikely to exist in the water column at a concentration that would be toxic to aquatic organisms. Therefore, the hazard to the environment from the paint formulation and spray painting processes should be negligible.

Loss of QAVR to the environment from surface coatings embedded with the notified substance as a result of weathering, polishing or cutting back of car finishes is likely to be gradual and

diffuse. Consequently, the hazard should be minimal. Disposal of painted articles containing QAVR by incineration, landfill or metal recycling is unlikely to present a hazard to the environment.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

There is no information on the effects of the notified chemical on human health. It has been shown in animal studies to have low acute oral and dermal toxicities as well as being a slight eye irritant and a non sensitiser to skin.

The notified chemical is not highly flammable and is non-reactive under normal use. It can be explosive, if dust clouds are formed due to damage to containers during import, transport and storage of the product containing the notified polymer or formed during use.

Under normal use conditions, when control and precautionary measures are implemented, it is unlikely that the notified chemical will pose any significant risk to occupational health.

Under the use pattern outlined by the manufacturer, the potential for public exposure to the notified chemical is low. Polishing and cutting back of paintwork on motor vehicles are conducted infrequently by the public and as the level of the notified chemical in paint is low, and skin absorption or inhalation of the notified chemical is unlikely, the hazard to the public would be negligible from this aspect of the chemicals use.

13. RECOMMENDATIONS

To minimise occupational exposure to QAVR the following guide-lines and precautions should be observed:

. local exhaust ventilation should be used where there is a likelihood of aerosol generation;

. if engineering controls and work practices are insufficient to reduce exposure to a safe level, the following personal protective equipment which complies with Australian Standards should be worn such as respiratory protection

devices (AS 1715-1991 (9), AS 1716-1992 (10)), safety spectacles with side shield (AS 1336-1982) (11), AS 1337-1982 (12)), gloves (AS 2161-1978 (13)) and overalls (AS 3765.1-1990 (14), AS 3765.2-1990 (15)); and

. a copy of the Material Safety Data Sheet (MSDS) should be easily accessible to all employees.

14. MATERIAL SAFETY DATA SHEET

The Material Safety Data Sheet (MSDS) for QAVR (attachment 1) was provided in Worksafe Australia format (16). This MSDS was provided by Ciba-Geigy Australia 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 Ciba-Geigy Australia Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989* (the Act), secondary notification of QAVR shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. Further information may be required if the conditions of use are varied and as a result greater exposure of the public is likely.

16. REFERENCES

1. The Science of the Total Environment, 119, p85-119, 1992.

2. Anliker R. & Moser P., "The limits of boiaccumulation of Organic Pigments in Fish: Their relation to the Partition Coefficient and their Solubility in Water and Octanol", paper presented at the International Symposium on "Bioavailability of Environmental Chemicals", Schmallenberg-Grafschaft, Germany, September 12-14, 1984.

3. Ciba-Geigy, Switzerland, "TKP50000 Acute Oral Toxicity to the Rat". Data on file, Test No: 914512, 1992.

4. Ciba-Geigy, Switzerland, "TKP50000 Acute Dermal Toxicity to the Rat". Data on file, Test No: 914153, 1992.

5. Ciba-Geigy, Switzerland, "TKP50000 Skin Irritation to the Rabbit". Data on file, Test No: 914154, 1992.

6. Ciba-Geigy, Switzerland, "TKP50000 Eye Irritation to the Rabbit". Data on file, Test No: 914155, 1992.

7. Ciba-Geigy, Switzerland, "TKP50000 Skin Sensitisation to the Guinea Pig". Data on file, Test No: 914156, 1992.

8. Magnusson B., Contact Dermatitis 6, 46-50, 1980.

9. Australian Standard 1715-1991, "Selection, Use and Maintenance of Respiratory Protective Devices" Standards Association of Australia Publ., Sydney 1991.

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

11. Australian Standard 1336-1982, "Recommended Practices for Eye Protection in the Industrial Environment", Standards Association of Australia Publ., Sydney 1982.

12. Australian Standard 1337-1982, "Eye protectors for Industrial Applications", Standards Association of Australia Publ., Sydney 1982.

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

14. 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 1990.

15. Australian Standard 3765.2-1990, "Clothing for Protection Against Hazardous Chemicals, Part 2: Limited Protection Against Specific Chemicals", Standards Association of Australia Publ., Sydney 1990.

16. National Occupational Health and Safety Commission, Guidance Note for the Completion of a Material Safety Data Sheet, 2nd edition, AGPS, Canberra, 1990.