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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

K-9301

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

K-9301

1. APPLICANT

Konica Australia Pty Ltd of 22 Giffnock Avenue NORTH RYDE NSW 2133 and Printing Technologies Pty Ltd of 6 Joseph Street BLACKBURN VIC 3130 have jointly submitted a limited notification statement in support of their application for an assessment certificate for K-9301.

2. IDENTITY OF THE CHEMICAL

K-9301 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, molecular weight, spectral data and details of exact import volume have been exempted from publication in the Full Public Report and the Summary Report.

Generic Names:	hydroxylamine derivative substituted amine derivative
Other Names:	SP-9301
Trade Name:	K-9301
Method of Detection and Determination:	identity by ultraviolet/visible (UV/Vis) and infrared (IR) spectroscopy; assay by high performance liquid chromatography (HPLC)

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	white powder
Melting Point:	does not melt; decomposes above 295°C
Specific Gravity:	1.971
Vapour Pressure:	1.727×10^{-14} kPa at 25°C (extrapolation)
Water Solubility:	483 g/L (w/w) at 20°C

Partition Co-efficient (n-octanol/water):	log P_{ow} = -10.4 (calculated)	
Hydrolysis as a Function of pH:	not determined	
Particle Size:	> 183 μm	90.0%
	< 90 μm	50.0%
	< 40 μm	10.0%
	< 10 μm	0.7%
Adsorption/Desorption:	not determined	
Dissociation Constant:	pKa_3 < 2.5 (estimated - see comments below)	
Surface Activity:	72.9 mN/m at 20°C and 0.9214 g/L	
Flash Point:	not determined	
Flammability Limits:	not highly flammable	
Autoignition Temperature:	not autoflammable	
Explosive Properties:	non-explosive	
Reactivity/Stability:	non-oxidising	

Comments on Physico-Chemical Properties

Tests were performed according to EEC test guidelines (1) at facilities complying with OECD or Department of Health (UK) Principles of Good Laboratory Practice.

Preliminary testing indicated that the notified chemical decomposed at approximately 563 K (290°C) before melting. Therefore, it would decompose prior to boiling. The vapour pressure was measured over a range of temperatures to enable extrapolation to 298.15 K (25°C).

The notifier provided expert opinion indicating that the notified chemical is hydrolytically stable, not easily hydrolysable either under acidic, neutral or basic conditions. The notified chemical does not contain any readily hydrolysable groups. The notifier claims that the dissociation constant of the notified chemical could not be measured as the free acid or base form cannot exist. According to the EU Test Guideline A8, the K_{ow} value must be measured in the non-ionised form of the substance. Therefore, the notifier estimated the log K_{ow} by the Hansch-π calculation method.

The notifier claims that no adsorption/desorption data are available. Due to its very high water solubility, it is unlikely that the notified chemical will bind strongly to soil/sediment.

Determination of the pKa_1 ~ pKa_3 using an acid-base titration method according to OECD Test Guideline 112 was attempted. However, a clear titration curve was not obtained. Only the value of pKa_3 was estimated to be less than 2.5.

The notified chemical is not expected to be surface active. By definition, a chemical has surface activity when the surface tension is less than 60 mN/m (1).

4. PURITY OF THE CHEMICAL

Degree of Purity: > 96.5%

5. USE, VOLUME AND FORMULATION

The notified chemical will not be manufactured in Australia and will be imported for use as a stabiliser in photo-processing chemicals. It will be imported as a component of solid preparations (tablets) at a concentration of less than 10%, as well as a component of liquid preparations at a concentration of less than 25%.

Less than one tonne of the notified chemical will be imported annually for each of the first five years.

6. OCCUPATIONAL EXPOSURE

The notified chemical will be imported into Australia as a component of formulated photo-processing chemicals, either as a solution in 0.5 L plastic sealed bottles, or in the form of tablets contained within sealed cartridges. Occupational exposure during transport and storage is unlikely to occur except in the event of an accident.

The main source of exposure to the liquid products will occur during charging of photo-processing machines. Dermal and accidental ocular contact may occur when pouring in the contents of the plastic bottles (which may produce spilling and splashing) and during the exchange of effluent tanks containing waste solutions. For the formulated products in tablet form, the tablets are supplied in an enclosed cartridge, therefore the only potential for exposure to the notified chemical is by exposure to the waste solution when exchanging a full effluent tank for an empty one. After dilution within the processing machine, however, the notified chemical will be at a concentration of approximately 0.05% (500 ppm) in the effluent solutions.

As the actual photo-processing is carried out automatically within an automated, closed system, there is minimal potential for exposure during this process. In addition, the notifier states that photographic and graphic arts laboratories usually have local ventilation to maintain a low level of fumes from the film development process.

7. PUBLIC EXPOSURE

Neither K-9301 by itself, nor formulated products containing the notified chemical will be available to the public.

K-9301 will only enter the public domain in the form of diluted waste water solution when discharged to the sewer (in the sub ppb range). Therefore, public exposure is anticipated to be minimal due to the minimal release of K-9301 to the environment. No significant public exposure to the notified chemical is expected to occur through the intended commercial use or via contact with treated end-use product.

8. ENVIRONMENTAL EXPOSURE

Release

The approximate number of sites in Australia where the notified chemical is expected to be used is 65. No environmental exposure during transport of the chemical is expected. In the event of accidental spillages or mishandling, environmental exposure would be minimal due to the small container size. Also there are adequate instructions on the Material Safety Data Sheet (MSDS) to deal with spillage situations.

The concentration of the notified chemical will be reduced after dilution within the processing machine. Balancing tanks or pits are used to combine photographic wastes and to achieve further dilution. As photographic waste solutions are generally silver-bearing, wastes must be treated according to the Photographic Uniform Regulations for the Environment (P.U.R.E.) Code of Practice (2), which involves treating wastes in a silver recovery system. This Code of Practice applies in all parts of Australia. Prior to discharge to the sewer, the liquid effluent must be further diluted to further reduce the silver concentration, and the concentrations of other chemicals. All sites must also ensure that their liquid wastes are covered by a Trade Waste Discharge Agreement (or Permit) with the local water authority. In Melbourne, however, the metropolitan sewage authority does not allow discharge of photo-waste liquids to sewer unless a testing program has been conducted and approved, to demonstrate compliance with their acceptance limits for waste water. Where direct discharge to sewer does not occur, eg Melbourne, liquid wastes are collected by a licensed waste transporter for treatment and disposal under controlled conditions.

The cartridges are made from polyethylene and are designed for recycling. The plastic bottles are typically rinsed with water which is then added to the processing machine. Rinsed bottles are then disposed of to landfill.

Fate

Under the P.U.R.E. guidelines (2), the preferred method of disposal of photographic chemicals is dilution and balancing with other photo-chemicals and water, and de-silvering, then disposal to sewer. Because of the high solubility and as it is unlikely that the notified chemical will adsorb to sludge, it is expected to remain in

solution during the waste treatment process and be discharged to sewer.

The notified chemical was found to be not biodegradable in the OECD 301D Test for Ready Biodegradability (Closed Bottle Test) (3). Expressed as a percentage of theoretical oxygen demand, biodegradation amounted to 17% at the end of the 28-day exposure to micro-organisms from a domestic sewage treatment plant. However, the guideline notes that because of the stringency of the test, failure to meet the ready biodegradation criterion does not mean that the test substance will not be biodegradable in the natural environment. Therefore, it is expected that the notified chemical will not be highly persistent and exhibit some biodegradation when released in the environment. No inhibition of the activity of the bacteria was observed in this test.

Bioaccumulation is not expected due to the chemicals low log K_{ow} (-10.4) and high water solubility (483 g/L) (4).

9. EVALUATION OF TOXICOLOGICAL DATA

Toxicological data are not required for chemicals with import volumes less than 1 tonne per annum, according to the Act. However, the following toxicological data were provided by the notifier for K-9301.

9.1 Acute Toxicity

Summary of the acute toxicity of K-9301

Test	*Species*	*Outcome*	*Reference*
acute oral toxicity	rat	LD_{50} > 2 000 mg/kg	(5)
skin irritation	rabbit	non-irritant	(6)
eye irritation	rabbit	mild irritant	(7)
skin sensitisation	guinea pig	non-sensitising	(8)

9.1.1 Oral Toxicity (5)

Species/strain:	rat/Sprague-Dawley
Number/sex of animals:	5/sex
Observation period:	14 days
Method of administration:	gavage; 2 000 mg/kg of the test substance was administered in distilled water
Clinical observations:	no signs of systemic toxicity were noted
Mortality:	none

Morphological findings:	none
Test method:	similar to OECD Guidelines (3)
LD_{50}:	> 2 000 mg/kg
Result:	the notified chemical was of low toxicity to rats when administered orally in a limit test

9.1.4 Skin Irritation (6)

Species/strain:	rabbit/New Zealand White
Number/sex of animals:	3/female
Observation period:	72 hours
Method of administration:	500 mg of the notified chemical (moistened with distilled water), applied to an intact dorsal skin site under semi-occlusive dressing for 4 hours; site washed with lukewarm water after dressing removed; observations made at 1 hour, 24, 48 and 72 hours after removal of dressing and scored according to the method of Draize (9)
Draize scores (9):	one rabbit had very slight erythema at the test site at the 1 hour reading; there were no other signs of irritation
Test method:	similar to OECD guidelines (3)
Result:	the notified chemical showed signs of very slight, transient skin irritation in rabbits, but would not be considered an irritant in this species

9.1.5 Eye Irritation (7)

Species/strain:	rabbit/New Zealand White
Number/sex of animals:	3/female
Observation period:	72 hours
Method of administration:	0.1 mL (54 mg) of the notified chemical was instilled into the conjunctival sac of the right eye; untreated eye served as control

Draize scores (9) of unirrigated eyes:

	Time after instillation											
Animal	**1 hour**			**24 hours**			**48 hours**			**72 hours**		
Cornea	**o[a]**	**a[b]**		**o[a]**	**a[b]**		**o[a]**	**a[b]**		**o[a]**	**a[b]**	
1	0[1]	0		0	0		0	0		0	0	
2	0	0		0	0		0	0		0	0	
3	0	0		0	0		0	0		0	0	
Iris												
1	1			1			0			0		
2	0			0			0			0		
3	1			0			0			0		
Conjunctiva	**r[c]**	**c[d]**	**d[e]**	**r[c]**	**c[d]**	**d[e]**	**r[c]**	**c[d]**	**d[e]**	**r[c]**	**c[d]**	**d[e]**
1	2	2	2	1	1	1	1	0	0	0	0	0
2	1	1	1	1	0	0	0	0	0	0	0	0
3	2	2	2	1	1	0	0	0	0	0	0	0

[1] see Attachment 1 for Draize scales
[a] opacity [b] area [c] redness [d] chemosis [e] discharge

Test method: similar to OECD guidelines (3)

Result: the notified chemical was a slight irritant to rabbit eyes

9.1.6 Skin Sensitisation (8)

Species/strain: guinea pig/Dunkin Hartley (albino)

Number of animals: 30/female; 20 test, 10 control

Induction procedure: Day 0: 3 pairs of intradermal injections:
- 0.1 mL Freund's complete adjuvant (FCA): distilled water (1:1(v/v))
- 0.1 mL of 25% concentration of test material in distilled water
- 0.1 mL of 25% concentration of test material in FCA: distilled water (1:1 (v/v))

Day 7: occluded application of filter paper soaked in test material (75% in

distilled water) for 48 hours

Challenge procedure: Day 22: occluded application of filter paper soaked in test material (50% and 75% in distilled water) for 24 hours

Challenge outcome:

	Test animals		***Control animals***	
Challenge concentration	***24 hours****	***48 hours****	***24 hours***	***48 hours***
50%	0/20**	0/20	0/10	0/10
75%	0/20	0/20	0/10	0/10

* time after patch removal
** number of animals exhibiting positive response

Test method: similar to OECD guidelines (3)

Result: the notified chemical was not a skin sensitiser in guinea pigs

9.3 Genotoxicity

9.3.1 *Salmonella typhimurium* Reverse Mutation Assay (10)

Strains: *Salmonella typhimurium* TA 100, TA 1535, TA 98, TA 1537 and *Escherichia coli* WP2*uvrA*

Concentration range: 313 - 5 000 μg/plate

Test method: similar to OECD guidelines (3)

Result: the notified chemical was not toxic towards the tester strains at 5 000 μg/plate; there were no significant increases in revertant colony numbers at any dose level either in the presence or absence of metabolic activation (rat liver S9 fraction); the notified chemical is not considered to be mutagenic in bacteria

9.4 Overall Assessment of Toxicological Data

The notified chemical was of low oral toxicity in rats (LD_{50} > 2 000 mg/kg). K-9301 was not a skin irritant in rabbits, although it caused mild eye irritation when tested in the same species. The notified chemical was not a skin sensitiser in guinea pigs. No mutagenic potential was exhibited in bacterial tests, in either the presence or absence of metabolic activation.

Based on the limited data set provided by the notifier, the notified chemical would not be classified as hazardous according to the *Approved Criteria for Classifying Hazardous Substances* (11).

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

Ecotoxicological data are not required for chemicals with import volumes less than 1 tonne per year according to the Act. However, the notifier supplied the following ecotoxicity studies. The tests were carried out to OECD Test Methods (3) and to OECD/UK Department of Health Principles of Good Laboratory Practice.

Test	***Species***	***Results (Nominal)***
96 hour Acute Toxicity Semi-static OECD TG 203	Zebra fish (*Brachydanio rerio*)	LC_{50} > 100 mg/L NOEC ≥ 100 mg/L
48 hour Acute Immobilisation Static OECD TG 202	Water flea (*Daphnia magna*)	EC_{50} > 100 mg/L NOEC ≥ 100 mg/L
72 hour Growth Inhibition b = biomass, μ = growth OECD TG 201	Green Alga (*Scenedesmus capricornutum*)	EbC_{50} > 1 000 mg/L $E\mu C_{50}$ > 1 000 mg/L NOEC ≥ 1 000 mg/L

The concentrations of the notified chemical over the test periods were determined to be stable, ranging from 90 to 99% of nominal.

The ecotoxicity data suggests that the notified chemical is practically non-toxic to fish, invertebrates and algae. Test organisms did not exhibit any adverse reactions when exposed to the notified chemical at maximum testing concentrations.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

It is anticipated that the notified chemical will be used at about 65 sites throughout Australia. Product packaging and good industrial practice should ensure that there is limited exposure to the environment, other than that through discharge of spent processing liquids. The notifier claims that a notified chemical concentration of about 0.05% (500 ppm) will be present in the effluent solutions discharged to the sewer. Here the effluent will be further diluted, with the notifier estimating a dilution factor of 1 000 being achieved. The final effluent discharge concentration is estimated to be in the parts per billion (ppb) range. Once discharged to the aquatic environment, the notified chemical is expected to remain in the water column where it will be further diluted and slowly degraded.

In the unlikely scenario where the total volume imported is discharged to a sewer in a large country town in one day, the notified chemical once diluted in the sewage

system would be present in a concentration of 44 mg/L. Discharge to receiving waters (river with 1:2 dilution) would reduce the predicted environmental concentration (PEC) to 22 mg/L. This severe worst case scenario still calculates a PEC with a safety factor of 5 for the lowest determined NOEC (≥ 100 mg/L) for fish and water fleas.

The notified chemical is not expected to present any significant hazard to the environment through the proposed uses.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified chemical will be imported as a component of formulated photo-processing chemicals, either as a solution in 0.5 L plastic bottles or in the form of tablets contained within a cartridge. Occupational or public exposure during transport is unlikely to occur except in the event of an accident.

The occupational health risk posed to workers in photo-processing laboratories is low. There will be limited opportunity for workers to be exposed to the notified chemical, especially in the instances where the formulation is supplied in tablet form. Dermal or accidental ocular exposure may occur when workers are handling liquid preparations containing the notified chemical. If dermal exposure occurs, the notified chemical is not expected to be a skin irritant or sensitiser, based on the results of animal studies, but may cause slight eye irritation in humans.

Workers should be aware that other components of the Konica photo-processing preparation (which is imported in tablet form) may present a toxicological hazard. If direct contact with the tablets or photo-processing waste containing these

components is likely, workers should follow recommendations made on the notifier's MSDS.

No significant public exposure to the notified chemical is expected to occur through the intended commercial use or via contact with treated end-use product, and hence the public health risk is expected to be negligible.

12. RECOMMENDATIONS

To minimise occupational exposure to K-9301 the following guidelines and precautions should be observed:

- It is good work practice to wear industrial clothing which conforms to the specifications detailed in Australian Standard (AS) 2919 (12) and occupational footwear which conforms to Australian and New Zealand Standard (AS/NZS) 2210 (13) to minimise exposure when handling any industrial chemical;

- Spillage of products containing the notified chemical should be avoided, spillages should be cleaned up promptly and put into containers for disposal;

- Good personal hygiene should be practised to minimise the potential for ingestion;

- A copy of the MSDS should be easily accessible to employees.

In addition, workers should be aware that other components of the Konica photo-processing preparation containing the notified chemical may be present a toxicological hazard, and appropriate precautions should be taken where necessary to avoid exposure (see notifier's MSDS).

14. MATERIAL SAFETY DATA SHEET

The MSDS for products containing the notified chemical were provided in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (14).

These MSDS were provided by the applicants as part of the notification statement. They are reproduced here as a matter of public record. The accuracy of this information remains the responsibility of the applicants.

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. Secondary notification under Section 64 of the Act will be required if the method of use changes in such a way as to greatly increase the environmental exposure of the notified chemical, or if additional information becomes available on adverse environmental effects of the chemical. This includes if the notified chemical is to be used in other instances with different waste water treatment practices, as the notification is very "use" specific.

16. REFERENCES

1. European Economic Community (EEC) 1992, 'Methods for the Determination of Physico-Chemical Properties', in *EEC Directive 92/69, Annex V, Part A, EEC Publication No. L383*, EEC.

2. Photographic Uniform Regulations for the Environment (PURE) 1997, *Photographic Film and Paper Processing (Liquid Wastes) - A Synopsis of the Photographic Code of Practice - DRAFT May 1997*, PICA (The Photographic and Imaging Council of Australia), Victoria.

3. Organisation for Economic Co-operation and Development 1995-1996, *OECD Guidelines for the Testing of Chemicals on CD-Rom*, OECD, Paris.

4. Connell, D.W. 1989, 'General characteristics of organic compounds which exhibit bioaccumulation', in *Bioaccumulation of Xenobiotic Compounds*, CRC Press, Boca Raton.

5. Driscoll, R. 1993, *SP-9301: Acute Oral Toxicity (Limit Test) in the Rat*, Project no., 160/182, Safepharm Laboratories Limited, UK.

6. Driscoll, R. 1993, *SP-9301: Acute Dermal Irritation Test in the Rabbit*, Safepharm Laboratories Limited, UK.

7. Driscoll, R. 1993, *SP-9301: Acute Eye Irritation Test in the Rabbit*, Project no., 160/184, Safepharm Laboratories Limited, UK.

8. Driscoll, R. 1993, *SP-9301: Magnusson & Kligman Maximisation study in the Guinea Pig*, Project no., 160/185, Safepharm Laboratories Limited, UK.

9. Draize, J.H. 1959, 'Appraisal of the Safety of Chemicals in Foods, Drugs and Cosmetics', *Association of Food and Drug Officials of the US*, vol. 49, pp. 2-56.

10. Kawaguchi, Y. 1994, *Microbial Metabolic Activation Test to Assess the Potential Mutagenic Effect of 9312-M*, Konica Corporation, Japan.

11. National Occupational Health and Safety Commission 1994, *Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1994)]*, Australian Government Publishing Service, Canberra.

12. Standards Australia 1987, *Australian Standard 2919-1987, Industrial Clothing*, Standards Association of Australia, Sydney.

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

14. 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.

Attachment 1

The Draize Scale for evaluation of skin reactions is as follows:

Erythema Formation	*Rating*	*Oedema Formation*	*Rating*
No erythema	0	No oedema	0
Very slight erythema (barely perceptible)	1	Very slight oedema (barely perceptible)	1
Well-defined erythema	2	Slight oedema (edges of area well-defined by definite raising	2
Moderate to severe erythema	3	Moderate oedema (raised approx. 1 mm)	3
Severe erythema (beet redness)	4	Severe oedema (raised more than 1 mm and extending beyond area of exposure)	4

The Draize scale for evaluation of eye reactions is as follows:

CORNEA

Opacity	*Rating*	*Area of Cornea involved*	*Rating*
No opacity	0 none	25% or less (not zero)	1
Diffuse area, details of iris clearly visible	1 slight	25% to 50%	2
Easily visible translucent areas, details of iris slightly obscure	2 mild	50% to 75%	3
Opalescent areas, no details of iris visible, size of pupil barely discernible	3 moderate	Greater than 75%	4
Opaque, iris invisible	4 severe		

CONJUNCTIVAE

Redness	*Rating*	*Chemosis*	*Rating*	*Discharge*	*Rating*
Vessels normal	0 none	No swelling	0 none	No discharge	0 none
Vessels definitely injected above normal	1 slight	Any swelling above normal	1 slight	Any amount different from normal	1 slight
More diffuse, deeper crimson red with individual vessels not easily discernible	2 mod.	Obvious swelling with partial eversion of lids	2 mild	Discharge with moistening of lids and adjacent hairs	2 mod.
Diffuse beefy red	3 severe	Swelling with lids half-closed	3 mod.	Discharge with moistening of lids and hairs and considerable area around eye	3 severe
		Swelling with lids half-closed to completely closed	4 severe		

IRIS

Values	*Rating*
Normal	0 none
Folds above normal, congestion, swelling, circumcorneal injection, iris reacts to light	1 slight
No reaction to light, haemorrhage, gross destruction	2 severe