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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME  
(NICNAS)**

**FULL PUBLIC REPORT**

**Chemical in T74S Photocopier Toner**

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989* (Cwlth) (the Act) and Regulations. This legislation is an Act of the Commonwealth of Australia. The National Industrial Chemicals Notification and Assessment Scheme (NICNAS) is administered by the Department of Health and Ageing, and conducts the risk assessment for public health and occupational health and safety. The assessment of environmental risk is conducted by the Department of the Environment, Water, Heritage and the Arts.

For the purposes of subsection 78(1) of the Act, this Full Public Report may be inspected at our NICNAS office by appointment only at 334-336 Illawarra Road, Marrickville NSW 2204.

This Full Public Report is also available for viewing and downloading from the NICNAS website or available on request, free of charge, by contacting NICNAS. For requests and enquiries please contact the NICNAS Administration Coordinator at:

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**Director  
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## **TABLE OF CONTENTS**

<b><u>FULL PUBLIC REPORT</u></b> .....	3
1. APPLICANT AND NOTIFICATION DETAILS.....	3
2. IDENTITY OF CHEMICAL .....	3
3. COMPOSITION.....	3
4. PHYSICAL AND CHEMICAL PROPERTIES.....	3
5. INTRODUCTION AND USE INFORMATION.....	4
6. HUMAN HEALTH IMPLICATIONS.....	5
6.1 Exposure assessment.....	5
6.1.1 Occupational exposure.....	5
6.1.2 Public exposure .....	7
6.2. Human health effects assessment.....	7
6.3. Human health risk characterisation.....	7
6.3.1. Occupational health and safety.....	7
6.3.2. Public health.....	8
7. ENVIRONMENTAL IMPLICATIONS.....	8
7.1 Environmental Exposure & Fate Assessment .....	8
7.1.1 Environmental Exposure .....	8
7.1.2 Environmental fate .....	8
7.1.3 Predicted Environmental Concentration (PEC).....	9
7.2 Environmental effects assessment .....	9
7.2.1 Predicted No-Effect Concentration .....	9
7.3 Environmental risk assessment .....	9
8. CONCLUSIONS AND REGULATORY OBLIGATIONS.....	9
Hazard classification .....	9
Human health risk assessment.....	9
Environmental risk assessment.....	9
Recommendations .....	10
Regulatory Obligations .....	10
<b><u>APPENDIX A: PHYSICAL AND CHEMICAL PROPERTIES</u></b> .....	12
<b><u>BIBLIOGRAPHY</u></b> .....	14

**FULL PUBLIC REPORT****Chemical in T74S Photocopier Toner****1. APPLICANT AND NOTIFICATION DETAILS**

## APPLICANT(S)

Ciba (Australia) Pty Ltd (ABN: 97 005 061 469)  
235 Settlement Road  
Thomastown Vic 3074

## NOTIFICATION CATEGORY

Limited-small volume: Chemical other than polymer, (1 tonne or less per year).

## EXEMPT INFORMATION (SECTION 75 OF THE ACT)

Data items and details claimed exempt from publication:

Chemical name, Other names, CAS number, Molecular formula, Structural formula, Molecular weight, Spectral data, Methods of detection and determination, Degree of purity, Hazardous impurities, Non-Hazardous impurities, Additives/adjuvants, Import volume, Identity of sites.

## VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

Variation to the schedule of data requirements is claimed as follows:

Vapour pressure, Hydrolysis as a function of pH, Adsorption / desorption, Dissociation constant, Flash point, Reactivity.

## PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

None

## NOTIFICATION IN OTHER COUNTRIES

EU, Korea, China and Japan.

**2. IDENTITY OF CHEMICAL**

## MARKETING NAME(S)

T74S Photocopier Toner (product)

## OTHER NAME

T74S (product)

## ANALYTICAL DATA

Reference LC (PDA)-MS spectra were provided (Chemical Evaluation, 2009).

**3. COMPOSITION**

DEGREE OF PURITY          100% (reaction mixture)

**4. PHYSICAL AND CHEMICAL PROPERTIES**

APPEARANCE AT 20°C AND 101.3 kPa: Yellow solid powder with no odour.

Property	Value	Data Source/Justification
Melting Point	Did not melt below 400 °C	Measured
Boiling Point	Did not boil below 400 °C	Measured
Density	1274 kg/m <sup>3</sup> at 20°C	Measured
Vapour Pressure	Not determined	The notified chemical is not expected to be volatile based on its molecular weight and functional group chemistry.
Water Solubility	1.8 g/L at 20°C	Measured at pH 5.06-5.32
Partition Coefficient (n-octanol/water)	log Pow = 2.7 at 20°C	Measured on the ionised form by HPLC.
Adsorption/Desorption	Not determined	The notified chemical is an anion in the environment pH range (4-9) and may therefore be mobile.
Dissociation Constant	pK <sub>a1</sub> = 0.87; pK <sub>a2</sub> = 4.41	Calculated. The notified chemical has acid groups and is expected to be fully ionised in the environmental pH range.
Particle Size	Respirable fraction (<10µm):100% MMD* = 1.6 µm	Measured
Solid Flammability	Not Highly flammable	Measured
Autoignition Temperature	Expected to be 269°C	Measured
Explosive Properties	Not explosive	Estimated
Oxidizing Properties	Not oxidizing	Estimated

\*MMD = Mass Median Diameter

#### DISCUSSION OF PROPERTIES

For full details of tests on physical and chemical properties, refer to Appendix A.

#### Reactivity

There are no known conditions that contribute to the notified chemical's instability, and no substances are known that are incompatible with the notified chemical. The likely decomposition products of combustion are expected to be water, oxides of carbon, oxides of nitrogen and chlorides.

#### Dangerous Goods classification

Based on the submitted physical-chemical data in the above table the notified chemical is not classified according to the Australian Dangerous Goods Code (NTC, 2007). However the data above does not address all Dangerous Goods endpoints. Therefore consideration of all endpoints should be undertaken before a final decision on the Dangerous Goods classification is made by the introducer of the chemical.

## 5. INTRODUCTION AND USE INFORMATION

#### MODE OF INTRODUCTION OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS

The notified chemical will be imported as a component of toner in purpose-built sealed toner cartridges (typically 800 g – 1200 g) for use in photocopying and printing.

#### MAXIMUM INTRODUCTION VOLUME OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS

Year	1	2	3	4	5
Tonnes	<1	<1	<1	<1	<1

#### PORT OF ENTRY

Melbourne, Sydney

#### IDENTITY OF MANUFACTURER/RECIPIENTS

Ciba (Australia) Pty Ltd  
235 Settlement Road  
Thomastown VIC 3074

#### TRANSPORTATION AND PACKAGING

The toner containing the notified chemical will be imported by sea or air in sealed photocopier toner or printer cartridges or bottles. It will be transported to end users without repacking.

#### USE

The notified chemical will be used as a component up to 0.1% of photocopier and printer toner.

#### OPERATION DESCRIPTION

The notified chemical is imported as a component of photocopier or printer toner contained in sealed cartridges or bottles packaged in cardboard boxes. The cartridges will be transported and stored prior to national distribution where they will be used in office or home printing equipment. During use the toner bottle or cartridge is installed inside the photocopying or printing machine. During copying or printing, the toner will be transferred to the paper and firmly fixed to it by heat.

The cartridges will be installed/replaced either by office workers, service technicians or consumers.

## 6. HUMAN HEALTH IMPLICATIONS

### 6.1 Exposure assessment

#### 6.1.1 Occupational exposure

##### NUMBER AND CATEGORY OF WORKERS

<i>Category of Worker</i>	<i>Number</i>	<i>Exposure Duration (mins/day)</i>	<i>Exposure Frequency (days/year)</i>
Transport and warehouse	5 – 10	30	40 - 80
Point of sale	50 – 100	8 hours / day	200
Office workers	1000	10	5 – 10
Service technicians	50	45 – 60	200

##### EXPOSURE DETAILS

The notified chemical will be imported into Australia as a minor component of photocopier or printer toners in ready to sell packages. Formulated products contain up to 0.1% of notified chemical.

Warehouse, waterside and transport workers are unlikely to be exposed to the notified chemical unless the packaging is breached.

Office workers and service technicians may be intermittently exposed to the notified chemical contained in the toner cartridge or bottle when replacing the spent container, and during repair, maintenance and cleaning of printers or photocopiers. There may be some accidental spillage of toner onto the hands of the user during removal of the shutter or sealing tape or during placement of the bottle or cartridge into the copier or printer. Larger spills may also present the opportunity for the fine toner dust to enter the eyes or be inhaled; however, such spills are likely to be very infrequent.

Exposure is expected to be controlled through the design of the cartridges or bottles and the printing or photocopying machines. Service technicians often wear cotton disposable gloves when servicing the machines. Pre-packed cartridges or bottles are sealed and worker exposure to the toner is minimised by the use of the replacement procedures recommended by the manufacturer.

Workers involved in the disposal and recycling of these devices may also be exposed to the toner containing the notified chemical as the potential for contact with toner increases once the shutter or seal is removed.

Worker contact with the paper printed with toner containing the notified chemical is unlikely to result in dermal exposure, as it will be bound in the structure of the paper.



### 6.1.2. Public exposure

The transport of the bottles or cartridges should not lead to public exposure to the notified chemical unless there is an accidental spillage of the toner during transport. This should result in powder wastes being collected and placed onto paper then transferred into sealable containers and sent to either landfill or incineration facilities.

Public exposure to the toner during use would be similar to that of office workers, but would occur less frequently. Contact with the paper printed with toner containing the notified chemical is unlikely to result in dermal exposure, as it will be bound in the structure of the paper.

## 6.2. Human health effects assessment

No toxicity data were submitted. The notified chemical contains a functional group which has a structural alert for sensitisation. It also contains some minor components with azo linkages. Such components may be sensitising, and may break down to potentially mutagenic / carcinogenic amines. The significant water solubility and log  $K_{ow}$  of 2.7 of the notified chemical suggest that it can pass through biological membranes and thus be absorbed.

The particle size of the notified chemical is in the respirable range ( $< 10 \mu\text{m}$ ) and may be inhaled into the lower respiratory system. Approximately 7% by weight has a particle size of  $< 0.5 \mu\text{m}$ . While the particle distribution graph suggests that none of the particles are likely to be  $< 0.1 \mu\text{m}$  or 100 nm, measurement of the fraction  $< 0.5 \mu\text{m}$  was not carried out. However, the notified chemical is only present at up to 0.1% in toner ink inside the cartridge.

### Health hazard classification

Based on the data provided, the notified chemical is not classified as hazardous according to the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

## 6.3. Human health risk characterisation

### 6.3.1. Occupational health and safety

Toxicological studies on the notified chemical are not available, however its structure suggests that adverse effects such as skin sensitisation is possible. The physico-chemical properties indicate that it may be absorbed through biological membranes. Health effects are not expected to occur due to very low concentration of the notified chemical included in sealed toners.

The notified chemical will be imported in toner cartridges and bottles at a maximum of 0.1%. Incidental dermal or ocular exposure of office workers to the notified chemical may occur when replacing spent cartridges and bottles and clearing paper jams from printers or photocopiers. However, the design of the cartridges and bottles is such that exposure to the notified chemical is low.

Similarly, dermal exposure of maintenance workers to the notified chemical is possible during routine maintenance but is expected to be low due to the low concentration of the notified chemical ( $< 0.1\%$ ) in the toner. Protective clothes such as cotton or disposable gloves would further minimise exposure to the notified chemical during maintenance work.

Inhalation exposure could occur if the toner powder was spilt and dispersed in the air, which is expected to occur infrequently. During normal machine operation it is estimated that the level of toner in air would be low. Additionally, the level of the notified chemical in the toner is very low, therefore significant inhalation exposure is not likely. Use of mechanical or good general ventilation would minimise inhalation exposure. The MSDS for the toner product recommends use of local exhaust ventilation.

Based on the low expected exposure to the toner and the very low concentration ( $\leq 0.1\%$ ) of the notified chemical in the toner, the risk to workers is not considered to be unacceptable.

### 6.3.2. Public health

Public exposure, similar to that of workers, may occur from consumer use of printers and photocopiers, but is expected to be less frequent than that of workers, and therefore exposure would be lower.

Based on the very low expected exposure to the toner and the very low concentration ( $\leq 0.1\%$ ) of the notified chemical in the toner, the risk to the public is not considered to be unacceptable.

## 7. ENVIRONMENTAL IMPLICATIONS

### 7.1. Environmental Exposure & Fate Assessment

#### 7.1.1 Environmental Exposure

##### RELEASE OF CHEMICAL AT SITE

The notified chemical will be imported into Australia as a component of toner products in either sealed bottles or ready-to-use cartridges. No manufacturing and reformulation of the notified chemical will take place in Australia. Environmental release of the notified chemical is unlikely to occur during importation, storage and transportation.

##### RELEASE OF CHEMICAL FROM USE

The losses arising from use are not expected to be significant because the storage bottles and cartridges will remain sealed until they are placed inside photocopiers or printers. Under normal use, the notified chemical will be fixed into the cured toner that will be firmly fixed to the sheet of paper by heat. Therefore, limited release to the environment is expected. Accidental spillage of the toner during replacement of cartridges and bottles should result in powder wastes being sent to landfill. The main release pathway to the environment from use will be the disposal of used toner containers including the bottles and cartridges. The amount of residues is estimated to be  $< 5\%$  of the contained volume ( $< 50$  kg notified chemical per year).

##### RELEASE OF CHEMICAL FROM DISPOSAL

Most of the notified chemical (95%) will be bound to printed paper. The waste paper generated will be disposed through landfill, recycling, or domestic incineration. Current paper recycling rates in Australia are commonly accepted as 50%. During recycling processes, waste paper is repulped using a variety of chemical agents, which, amongst other things, enhance detachment of inks from the fibres. Recycling is carried out in paper mills where it is likely that at least primary sedimentation is carried out. It is estimated that the removal of ink particles during the de-inking phase of paper recycling is 30-60% efficient for xerographic copying. The notifier claims that 50% of poorly soluble substances will be removed to sludge after primary treatment, and the rest of the unremoved notified chemical may potentially be released to surface water (EC, 1994). The sludge produced by flotation and clarification will be de-watered and disposed of to landfill.

Residues of toner (incorporating the notified chemical) in the cartridges and bottles will be disposed of to landfill with the empty containers.

#### 7.1.2 Environmental fate

No environmental fate data were submitted. The notified chemical is expected to have limited potential for bioaccumulation in aquatic organisms based on the moderate log  $K_{OW}$  value (2.7) and its ionised form in the environment.

The majority of the notified chemical will be disposed to landfill in the form of toner residues in used containers, by direct disposal of printed paper that is associated with the notified chemical, or by the disposal of the sludge generated from the waste paper recycling processes. In landfill, the notified chemical is potentially mobile and may leach given the presence of anionic moieties. In either landfill or water, the notified chemical will be slowly degraded via biotic or abiotic pathways. The notified chemical may also be incinerated with the printed paper in domestic situations, which will yield water, inorganic acids, and oxides of carbon.



### 7.1.3 Predicted Environmental Concentration (PEC)

A PEC has been calculated assuming 50% recycling of the waste paper, and a worst case continental model in which none of the notified chemical entering waste water treatment plants (either on-site or municipal) is removed from the effluents.

<i>Predicted Environmental Concentration (PEC) for the Aquatic Compartment</i>		
Total Annual Import/Manufactured Volume	1,000	kg/year
Proportion expected to be released to sewer	50%	
Annual quantity of chemical released to sewer	500	kg/year
Days per year where release occurs	260	days/year
Daily chemical release:	1.92	kg/day
Water use	200	L/person/day
Population of Australia (Millions)	21.161	million
Removal within STP	0%	
Daily effluent production:	4,232	ML
Dilution Factor - River	1.0	
Dilution Factor - Ocean	10.0	
PEC - River:	0.45	µg/L
PEC - Ocean:	0.05	µg/L

## 7.2. Environmental effects assessment

No ecotoxicity data were submitted.

### 7.2.1 Predicted No-Effect Concentration

A PNEC cannot be calculated as no ecotoxicity data are provided for the notified chemical.

## 7.3. Environmental risk assessment

The Risk Quotient ( $Q = \text{PEC}/\text{PNEC}$ ) value has not been calculated since a PNEC cannot be calculated for the notified chemical. The concentration of the notified chemical in surface waters is expected to be very low based on the reported use pattern and the maximum import volume. Therefore, the notified chemical is not expected to pose an unacceptable risk to the environment.

## 8. CONCLUSIONS AND REGULATORY OBLIGATIONS

### Hazard classification

Based on the data provided, the notified chemical is not classified as hazardous according to the *Approved Criteria for Classifying Hazardous Substances* [NOHSC: 1008(2004)].

### Human health risk assessment

Under the conditions of the occupational settings described, the notified chemical is not considered to pose an unacceptable risk to the health of workers.

When used in the proposed manner, the notified chemical is not considered to pose an unacceptable risk to public health.

### Environmental risk assessment

On the basis of the PEC/PNEC ratio and the reported use pattern, the notified chemical is not considered to pose a risk to the environment.

## Recommendations

### CONTROL MEASURES

#### Occupational Health and Safety

- Employers should implement the following engineering controls to minimise occupational exposure to the notified chemical as introduced for use
  - Local Exhaust Ventilation or good general ventilation during printing or photocopying
- Employers should ensure that the following personal protective equipment is used by printer/photocopier maintenance workers to minimise occupational exposure to the notified chemical as introduced :
  - Gloves

Guidance in selection of personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

- A copy of the MSDS should be easily accessible to employees.
- If products and mixtures containing the notified chemical are classified as hazardous to health in accordance with the *Approved Criteria for Classifying Hazardous Substances* [NOHSC:1008(2004)] workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

#### Environment

- Do not allow material or contaminated packaging to enter drains, sewers, or water courses.

#### Disposal

- The notified chemical should be disposed of to landfill.

#### Emergency procedures

- Spills or accidental release of the notified chemical should be handled by physical containment, collection and subsequent safe disposal.
- Avoid the formation of airborne dusts
- Avoid dust inhalation

## Regulatory Obligations

This risk assessment is based on the information available at the time of notification. The Director may call for the reassessment of the chemical under secondary notification provisions based on changes in certain circumstances. Under Section 64 of the *Industrial Chemicals (Notification and Assessment) Act (1989)* the notifier, as well as any other importer or manufacturer of the notified chemical, have post-assessment regulatory obligations to notify NICNAS when any of these circumstances change. These obligations apply even when the notified chemical is listed on the Australian Inventory of Chemical Substances (AICS).

Therefore, the Director of NICNAS must be notified in writing within 28 days by the notifier, other importer or manufacturer:

- (1) Under Section 64(1) of the Act; if
  - the importation volume exceeds one tonne per annum notified chemical;
  - the chemical concentration in toner has exceeded or likely to exceed 0.1%;

or

- (2) Under Section 64(2) of the Act; if
- the function or use of the chemical has changed from a component of toner introduced in sealed cartridges or bottles;
  - the chemical has begun to be manufactured in Australia;
  - additional information has become available to the person as to an adverse effect of the chemical on occupational health and safety, public health, or the environment.

The Director will then decide whether a reassessment (i.e. a secondary notification and assessment) is required.

No additional secondary notification conditions are stipulated.

*Material Safety Data Sheet*

The MSDS of the notified chemical (and products containing the notified chemical) provided by the notifier were reviewed by NICNAS. The accuracy of the information on the MSDS remains the responsibility of the applicant.

**APPENDIX A: PHYSICAL AND CHEMICAL PROPERTIES****Melting Point/Freezing Point** No melting point was observed

Method OECD TG 102 Melting Point/Melting Range.  
EC Directive 92/69/EEC A.1 Melting/Freezing Temperature.

Remarks The notified substance does not melt under the conditions of the test.(Test was done with Temperature varying from 25 to 400 °C)

Test Facility RCC Ltd (2006a).

**Boiling Point** No boiling point was observed

Method OECD TG 103 Boiling Point.  
EC Directive 92/69/EEC A.2 Boiling Temperature.

Remarks The notified substance does not boil under the conditions of the test.

Test Facility RCC Ltd (2006a).

**Density** 1274 kg/m<sup>3</sup> at 20°C

Method OECD TG 109 Density of Liquids and Solids.  
EC Directive 92/69/EEC A.3 Relative Density.

Remarks The relative density of the notified substance was determined to be  $D_{4}^{20} = 1.274$

Test Facility RCC Ltd (2007a).

**Water Solubility** 1.8 mg/L at 20°C

Method OECD TG 105 Water Solubility.

Remarks Flask Method. A mixture containing 51.8% of the notified chemical in water at pH 5.06-5.32 was shaken at about 30°C for up to 72 hours, and then equilibrated for another 24 hours at 20°C. The supernatant solutions were centrifuged (~2900 g for 10 minutes) and filtered (Nylon 0.2 µm) prior to analysis using HPLC.

Test Facility RCC Ltd (2006b).

**Partition Coefficient (n-octanol/water)** log Pow = 2.7 at 20°C

Method OECD TG 117 Partition Coefficient (n-octanol/water).

Remarks HPLC Method. The dead time was determined by using thiourea. The partition coefficient was determined for the ionised form of the notified chemical (51.8% of a mixture) using a buffered aqueous methanol mobile phase (1 : 1 H<sub>2</sub>O : methanol, at pH 6.6).

Test Facility RCC Ltd (2006b)

**Particle Size** MMD = 1.6µm

Method OECD TG 110 Particle Size Distribution/Fibre Length and Diameter Distributions.

<i>Range (µm)</i>	<i>Mass (%)</i>
< 0.5	7.00
< 1.0	27.75
< 2.0	59.28
< 3.0	77.24
< 4.0	87.45
< 5.0	93.36
< 6.0	96.75
< 7.0	98.60
< 8.0	99.66
< 9.0	99.97
< 10.0	100.00

Remarks The mass median diameter (MMD) was determined to be 1.6 µm  
The graph of the study showed no particles < 0.3 µm, however it is likely that this was the limit of detection of the equipment.

Test Facility RCC Ltd (2007b).

**Flammability** Not highly flammable

Method EC Directive 92/69/EEC A.10 Flammability (Solids).

Remarks The test substance could be ignited with a flame during the preliminary test. In contact with the ignition source, the test substance turned black. Some yellow fume was observed. The flame did not expand. After a few seconds the flame extinguished. A black incrustation remained. Therefore, the main test was not performed. The test substance is not "highly flammable" according to the criteria of the guideline.

Test Facility RCC Ltd (2006c).

**Autoignition Temperature** 269°C

Method EC Directive 92/69/EEC A.15 Auto-Ignition Temperature (Liquids and Gases).  
EC Directive 92/69/EEC A.16 Relative Self-Ignition Temperature for Solids.

Remarks The test substance showed an exothermic reaction starting at about 264°C

Test Facility RCC Ltd (2007c).

**Explosive Properties** Not expected to be explosive

Method EC Directive 92/69/EEC A.14 Explosive Properties.

Remarks Estimated on the basis of structure, oxygen balance and a calorimetric test

Test Facility RCC Ltd (2007d).

**Oxidizing Properties** Not expected to be oxidizing

Method EC Directive 92/69/EEC A.17 Oxidizing Properties (Solids).

Remarks Estimated on basis of structure.

Test Facility RCC Ltd (2007e).

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