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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

4-PYRIMIDINOL, 2,5,6-TRIAMINO-, HYDROGEN SULFATE (ESTER)

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Street Address: 92 Parramatta Rd Camperdown, NSW 2050, AUSTRALIA
Postal Address: GPO Box 58, Sydney 2001, AUSTRALIA
Telephone: (61) (02) 9577-9514 FAX (61) (02) 9577-9465

Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

4-PYRIMIDINOL, 2,5,6-TRIAMINO-, HYDROGEN SULFATE (ESTER)

1. APPLICANT

GOLDWELL COSMETICS (AUSTRALIA) PTY LTD of 103 Yerrick Rd LAKEMBA NSW 2195 has submitted an limited notification statement in support of their application for an assessment certificate for 4-Pyrimidinol, 2,5,6-triamino-, hydrogen sulfate (ester). No claim for exempt information has been made.

2. IDENTITY OF THE CHEMICAL

The notifier did not request the identity of the chemical or other related information to be exempted from publication in the Full Public Report and the Summary Report.

Chemical Name: 4-Pyrimidinol, 2,5,6-triamino-, hydrogen sulfate (ester)

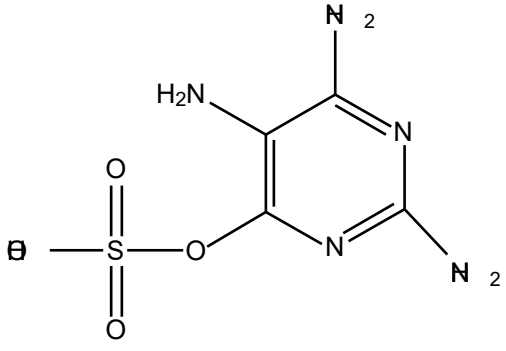
Chemical Abstracts Service (CAS) Registry No.: 1603-02-7

Other Names: 2,5,6-Triamino-4-pyrimidol sulfate
6-Hydroxy-2,4,5-triaminopyrimidine sulfate

Marketing Name: TRAP: FX50066

Molecular Formula: $C_4H_7N_5SO_4$

Structural Formula:



Molecular Weight: 239.21

Method of Detection and Determination: Infra Red (IR) spectroscopy

Spectral Data:	Major IR absorbance peaks at: 3321, 3083, 2610, 1689, 1506, 1129, 1078, 541 and 228 cm^{-1}.

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	Pale yellow crystals at 25 °C.
Boiling Point:	> 300 °C.
Specific Gravity:	No data available (for imported product 100°C)
Vapour Pressure:	Not determined, expected to be low.
Water Solubility:	1.5 g/L at 25°C.
Partition Co-efficient (n-octanol/water):	Log K_{ow} = -0.43
Hydrolysis as a Function of pH:	The chemical contains a sulfate ester group which may undergo hydrolysis under extreme conditions.
Adsorption/Desorption:	Based upon a partition co-efficient of -0.43, the notified chemical is not expected to bind strongly to organic matter in soil.
Dissociation Constant:	The chemical has pyridinium nitrogen, pKa range 3.0 to 7.0 (estimation), an arylaminium ion, pKa range 1.0 to 5.0 (estimation) and a sulfate group, pKa range -4.0 to –2.0 (estimation)
Flash Point:	Not flammable.
Flammability Limits:	Not applicable.
Autoignition Temperature:	Not expected to undergo auto-ignition.
Explosive Properties:	The chemical is stable and is not explosive.
Reactivity/Stability:	Not reactive, but may undergo oxidation in air.

Comments on Physico-Chemical Properties

From the solubility test report provided, it does not appear that the test was performed according to EEC/OECD test guidelines. The test method used, as indicated in the report provided, consisted of a weighed sample of the chemical being added to distilled water at 25ºC and stirred for 15 minutes. It was then determined visually if the material had dissolved.

The chemical contains a sulfate ester functional group that, under extreme conditions, may undergo hydrolysis.

The values for partition coefficient and dissociation constant were estimated via the use of an ADC software package (ADC, 1999). This assessment accepts the use of ADC software, based on the details provided.

The low partition coefficient indicates that the chemical will be highly mobile in soil and likely to remain in the water column. The chemical would be a strong acid in water and will dissociate readily in the environmental pH range of 4 to 9. This is supported by the pK_a estimates provided by the notifier, *ie* ranging from –4 to 7.

The chemical was tested on this assessment through the USEPA ASTER estimation model (USEPA, undated) for a number of physico-chemical parameters, with the results shown below. The ADC estimation for partition coefficient is within acceptable agreement with the ASTER values. However, ASTER estimation of water solubility is a number of orders of magnitude greater than the ADC estimation. For an environmental hazard assessment both solubilities indicate that the chemical is readily soluble, *i.e.* hydrophilic, and will stay dissolved in the water column.

ASTER Generated Physico-Chemical Parameters	
Vapour pressure	2.21×10^{-8} mm of Hg
Water solubility	3.1×10^{4} g/L
Partition Coefficient	-1.1 (log P)
Adsorption Coefficient	0.737 (log K_{oc})
Hydrolysis	not available
Dissociation Constant (pKa)	not available

4. PURITY OF THE CHEMICAL

Degree of Purity: > 97 %

Hazardous Impurities: < 3% unknown impurities

Additives/Adjuvants: None

5. USE, VOLUME AND FORMULATION

Use / Volume

The notified chemical will not be manufactured in Australia. It will be imported as part of a semi-permanent hair dye system in 25 or 100 kg foil lined plastic containers at a maximum concentration of 0.35 %. Approximately 50% will be imported in tubes as ready-to-use packaged hair dye products to be sold directly to hair salons. The balance will be imported in compounded hair color product in bulk, which will only require repackaging. No reformulation will take place in Australia. The products are destined for the professional hair salon market and are not intended for sale to the general public.

It is estimated that 150 kg of TRAP: FX50066 will be imported in year 1, increasing by 10 % per annum. The total import volume will be 184 kg/annum averaged over 5 years.

6. OCCUPATIONAL EXPOSURE

Approximately 50% of the notified chemical will be imported in finished hair dye crème (tubes) which are stored at the Notifier site and sold to the hair salons. The compounded hair colour for repackaging will be imported in 25 or 100 kg foil lined plastic containers. These bags will be directly sent to the customer site for packaging into 30 g, 60 g or 80 g tubes. It is anticipated that waterside workers, transport drivers and warehouse workers (up to eight persons) would only be exposed to the notified chemical in the event of an accident.

Repackaging

During filling, one operator is responsible for transferring the mixture via a pump to the hopper. Once the mixture is in the hopper of the filling machine, the process is performed in a sealed environment and is automated with low potential for further human contact with the substance. The same operator is responsible for cleaning and sanitising the hopper after a filling run and skin contact from splashes and spray with the notified chemical may occur. Up to 16 warehouse workers, plant operators and laboratory technicians may be potentially exposed to the finished product/compounded hair colour containing 0.35 % of the notified chemical.

During repackaging operations, eye and respiratory protection will be worn and gloves will be worn when sampling. Local exhaust ventilation is used throughout the process. Up to six packaging staff may be potentially exposed to the finished products. Laboratory technicians would be expected to wear safety glasses and laboratory coats.

Hairdressing Salon

The number of commercial salons across Australia is estimated in the 1 000 s. The number of employees would typically range between two to ten per salon. Hairdressers will apply the mixture/product containing the notified chemical to clients' hair and then wash it off after the

application. Hairdressers are exposed to the chemical at maximum concentrations of 0.35 %. The amount prepared for hair colouring would depend on the desired shade and the amount of hair coverage required. Exposure is primarily by skin contact, with potential for eye contact from splattering during mixing, application or rinsing. Personal protective equipment, where worn, would likely be cuff length disposable plastic or impermeable rubber gloves.

7. PUBLIC EXPOSURE

The general public will be exposed to the chemical by dermal contact only, when they have their hair treated in hairdressing salons. The extent and breadth of the exposure will be determined only by the commercial success of the product, however as hair colouring is a procedure unlikely to be performed on any one individual more frequently than every 4 to 6 weeks, the frequency of exposure is likely to be low.

As the notified chemical will only enter Australia as a component of hair dye products and will be present at 0.35 %, a transport accident is unlikely to release sufficient of the compound in a form which might pose a risk to the public. Similarly, as processing of the notified product within Australia will be limited to repack operations performed on pre formulated product, manufacturing is unlikely to lead to public exposure.

8. ENVIRONMENTAL EXPOSURE

Release

It is estimated that in the warehouse, spills may account for up to 1% loss of notified chemical, *i.e.* up to 2.2 kg/year in year 5. It is likely that this will go to landfill.

In the repackaging process, the filling machinery is washed between every filling. The notifier has estimated that 2% of waste notified chemical will be generated annually via equipment washing and spills. This equates to 3 kg in year 1 and 4.4 kg in year 5.

The washwater containing the waste notified chemical, is combined with other waste effluent streams and is sent to the on-site treatment plant. In the treatment plant, solids and oil are removed from the effluent which then undergoes chemical/biological treatment. The treated water is recycled into the process or used for garden maintenance. The resultant sludge is disposed of by a waste contractor who is assumed to take it to a landfill or an incinerator.

The notifier has estimated that 1% of the compounded product will be left in the bags lining the bulk imported containers. Thus, of the 110 kg of notified chemical that undergoes repackaging in the fifth year, approximately 1.1 kg is wasted. The internal liner prevents the outside plastic bulk container from being contaminated with product. These containers and liners are likely to be disposed of to landfill.

It is estimated that 2% of the contents of the end user's container will remain after emptying.

These containers will generally be disposed of via the domestic garbage system. Thus approximately 2% of the imported volume, i.e. 3 kg/year in the first year increasing to 4.4 kg in year 5, will end up in a landfill or be incinerated.

At each user site the notified chemical has the potential to end up in the sewage system. However, since the notified chemical should be consumed during the mixing of the dye and a high proportion of the dye should adsorb to the hair, no pure notified chemical, and only a proportion of the final dye should be washed down the drain.

Fate

A summary of the estimated annual amount of notified chemical wastes in year 5 is:

Spills in warehouse	1%	2.2 kg	landfill
Repackaging washwater (including spills)	2%	4.4 kg	recycled
Bulk container residue	0.5%	1.1 kg	landfill
User container residue	2%	4.4 kg	landfill

Approximately 3.5% of the imported chemical (7.7 kg) will end up being landfilled or incinerated. Due to the low partition coefficient and adsorption value, the chemical is likely to be highly mobile in soil and readily dissolve in water. Thus, the unreacted chemical is likely to leach out of a landfill but in very low concentrations and in a diffuse manner.

The remaining 94.5% of the imported volume of the notified chemical will reach the salons as the end product use. During the mixing with the other dye components, a reaction will take place during which the notified chemical will be consumed in the formation of the hair dye. Once applied and allowed to develop, it is likely that the majority of the dye will become bound to the hair. However, if the hair does not take the dye and the dye is washed down the sewer, the notified chemical will be bound in the dye matrix.

The estimated environmental partitioning calculated by the ASTER model indicates that the unreacted chemical will remain 100% dissolved in water, *ie* no adherence to soil or sediments.

The bioconcentration factor estimated by ASTER is 1. This indicates that the notified chemical is unlikely to bioconcentrate.

9. EVALUATION OF TOXICOLOGICAL DATA

An RTECS search showed an LD_{Lo} = 800 mg/kg (IP) in the mouse (RTECS, 1995). However, the MSDS indicated that it is irritating to the skin and eyes and may cause irritation to the respiratory system and gastrointestinal tract.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were provided.

No ecotoxicological estimations were generated by the ASTER model.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

Under the proposed use, the hazard posed by the chemical is very low.

At each user site, the notified chemical has the potential to end up in the sewage system. However, since the notified chemical should be consumed during the mixing of the dye and a high proportion of the dye should adsorb to the hair, no pure notified chemical, and only a proportion of the final dye should be washed down the drain. However, on the presumption that all of the notified chemical enters the sewer from the salon, the amount of chemical entering the sewer would be 94.5% (100-(1+2+0.5+2)) of the imported volume.

The estimated Predicted Environmental Concentration (PEC) for year 5 would be:

Quantity of notified chemical entering sewer	207.5 kg
Amount of entering the sewers nationally	2 700 ML
Number of days chemical used (estimation)	200 days
Dilution in receiving water	1:10
PEC	3.8×10^{-8} mg/L (3.8×10^{-5} ppb)

A worst case scenario would be if a number of the bulk containers lost their contents simultaneously into the sewer. In the PEC calculation below, it is presumed that the contents of 3 of the 100 kg bulk containers of product are lost to sewer, thus 1.05 kg of the notified chemical will be in the sewer. The PEC for this situation is calculated below.

Metropolitan STP:	Unreacted notified chemical released	1.05 kg
	Water handled by the STP	250 ML/day
	Dilution in receiving water	1:10
	PEC in receiving water	0.00042 mg/L (0.42 ppb)

The actual estimated amount of notified chemical reaching the environment is around 3.5%, *i.e.* 7.7 kg per annum. This 7.7 kg will most probably end up in a landfill or be incinerated. As mentioned above, the unreacted chemical is likely to leach out of a landfill, however, this will be in low concentrations and in a diffuse manner.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

Toxicological Hazard
No toxicological data was submitted for the notified chemical. The MSDS states that the chemical is a hazardous substance in accordance with the NOHSC *Approved Criteria for Classifying Substances (1999).* The chemical is not a hazardous substance at the imported concentration.

Available information indicates that the chemical is of low acute toxicity with a LD_{Lo} of 800 mg/kg by parenteral administration in mice (CBCCT, 1995). The notified chemical has a low molecular weight and the potential to be absorbed across the skin is unknown. It is unknown if the chemical is a sensitiser or causes long term health effects.

Occupational Health and Safety
The notified chemical will be imported at 0.35 % (maximum) as an ingredient as part of a semi-permanent hair dye product for professional/salon use only. Approximately 50 % will be imported in a ready to use packaged hair dye product with the balance for repackaging. No reformulation will take place in Australia.

Given the known toxicology and low concentration of the chemical, the risk of adverse health effects to waterside workers, transport and warehouse workers is expected to be negligible even in the event of spillage. Exposure after a spill would be controlled by use of the recommended practices for spillage clean up given in the MSDS supplied by the notifier.

During repackaging of the bulk hair colour to metal tubes, potential for dermal and eye exposure may occur as the operator transfers the mixture via a pump to the hopper and during cleaning of the equipment. Dermal absorption is not expected to be significant given the low concentration of notified chemical in the mixture. The risk of adverse systemic or topical health effects from the degree of exposure to the notified chemical anticipated during repackaging is expected to be negligible. During repackaging operations, it is stated that eye and respiratory protection will be worn and that gloves will be worn when sampling. Local exhaust ventilation is used throughout the packaging procedures. The risk of irritant effects during the filling operation is low as the process is enclosed and automated.

The MSDS for the notified chemical specifies impermeable nitrile or rubber gloves, glasses and a dusk mask should be worn when handling the chemical in pure crystalline form.

Hairdressers are likely to receive frequent, repeated or prolonged dermal contact to hair colours containing the notified chemical. As above, there is negligible risk of systemic toxicity following repeated or prolonged exposure to the notified chemical due to its low concentration in the hair dye product. However, the risk of irritant effects cannot be excluded, particularly so as hairdressers by occupation are likely to have a compromised skin barrier function. The notifiers end use product labels list the dye ingredients, and warn of the potential for skin irritation or sensitisation. Good hygiene practices, such as prompt removal of contaminants from the skin and the wearing of plastic or cotton lined gloves will be required to reduce the

risk of adverse skin effects. The MSDS for the end use product recommends that workers use impermeable vinyl, rubber or plastic gloves and eye protection.

Public Health & Exposure

Although the compound is stated to be irritating to the skin and eyes, the skin and eye irritation and dermal toxicity of the chemical are expected to be negligible at a concentration of 0.35% in the final products. Public exposure to the chemical is expected to be infrequent because the products containing the notified chemical will only be used in hair salons by hair dressing professionals and will not be sold to the public. Based on the available information, the proposed use of 2,5,6-triamino-4-pyrimidol sulfate is unlikely to present a significant risk to public health.

13. RECOMMENDATIONS

To minimise occupational exposure to TRAP FX:50066, the following guidelines and precautions should be observed:

- Safety goggles should be selected and fitted in accordance with Australian Standard (AS) 1336 (Standards Australia 1994) to comply with Australian/New Zealand Standard (AS/NZS) 1337 (Standards Australia/Standards New Zealand 1992); Industrial clothing should conform to the specifications detailed in AS 2919 (Standards Australia 1987) and AS 3765.1 (Standards Australia 1990); Impermeable gloves should conform to AS/NZS 2161.2 (Standards Australia 1998); all occupational footwear should conform to AS/NZS 2210 (Standards Australia/Standards New Zealand 1994);

- Spillage of the notified chemical should be avoided. Spillage should be cleaned up promptly with absorbents which should be put into containers for disposal;

- Good personal hygiene should be practiced to minimise the potential for skin and eye contact and ingestion;

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

  Hairdressers are encouraged to consult guidance documents for identifying and managing health risks in hairdressing that have been published by some state occupational health and safety authorities (Division of Workplace Health and Safety 1994; WorkCover NSW 1997; WorkCover Corporation 1996). The notifier should advise the hairdressing industry of the availability of state government publications in addition to any current industry codes.

If the conditions of use are varied, greater exposure of the public to the notified chemical may occur. Under such circumstances, further information will be required in order to assess the risks to public health.

14. MATERIAL SAFETY DATA SHEET

The MSDS for the notified chemical was provided in a format consistent with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC:2011(1994)).

This MSDS was provided by the applicant as part of the notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of the applicant.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

If the conditions of use are varied, and in particular if the compound is to be used at higher concentrations or in products for sale to the general public, greater exposure of the public to the notified chemical may occur. Under such circumstances, secondary notification under Section 64 of the Act, requiring further toxicology information, will be required in order to assess the risks to public health.

16. REFERENCES

Advanced Chemical Developments (ADC) (1999). Physico-chemical Laboratories.

National Occupational Health & Safety Commission Approved Criteria for Classifying Hazardous Substances, [NOHSC: 1008 (1999)], Canberra, Australian Government Publishing Service.

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Standards Australia/Standards New Zealand (1994) Australian/New Zealand Standard 2210-1994, Occupational Protective Footwear. Standards Association of Australia/Standards Association of New Zealand.

Standards Australia (1990) Australian Standard 3765.1-1990, Clothing for Protection against Hazardous Chemicals, Part 1 Protection against General or Specific Chemicals. Sydney, Standards Association of Australia.

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