1,3-Benzenediamine, 4-methyl-: Human health tier II assessment

22 November 2013

CAS Number: 95-80-7

Preface

This assessment was carried out by staff of the National Industrial Chemicals Notification and Assessment Scheme (NICNAS) using the Inventory Multi-tiered Assessment and Prioritisation (IMAP) framework.

The IMAP framework addresses the human health and environmental impacts of previously unassessed industrial chemicals listed on the Australian Inventory of Chemical Substances (the Inventory).

The framework was developed with significant input from stakeholders and provides a more rapid, flexible and transparent approach for the assessment of chemicals listed on the Inventory.

Stage One of the implementation of this framework, which lasted four years from 1 July 2012, examined 3000 chemicals meeting characteristics identified by stakeholders as needing priority assessment. This included chemicals for which NICNAS already held exposure information, chemicals identified as a concern or for which regulatory action had been taken overseas, and chemicals detected in international studies analysing chemicals present in babies' umbilical cord blood.

Stage Two of IMAP began in July 2016. We are continuing to assess chemicals on the Inventory, including chemicals identified as a concern for which action has been taken overseas and chemicals that can be rapidly identified and assessed by using Stage One information. We are also continuing to publish information for chemicals on the Inventory that pose a low risk to human health or the environment or both. This work provides efficiencies and enables us to identify higher risk chemicals requiring assessment.

The IMAP framework is a science and risk-based model designed to align the assessment effort with the human health and environmental impacts of chemicals. It has three tiers of assessment, with the assessment effort increasing with each tier. The Tier I assessment is a high throughput approach using tabulated electronic data. The Tier II assessment is an evaluation of risk on a substance-by-substance or chemical category-by-category basis. Tier III assessments are conducted to address specific concerns that could not be resolved during the Tier II assessment.

These assessments are carried out by staff employed by the Australian Government Department of Health and the Australian Government Department of the Environment and Energy. The human health and environment risk assessments are conducted and published separately, using information available at the time, and may be undertaken at different tiers.

This chemical or group of chemicals are being assessed at Tier II because the Tier I assessment indicated that it needed further investigation.

For more detail on this program please visit:www.nicnas.gov.au

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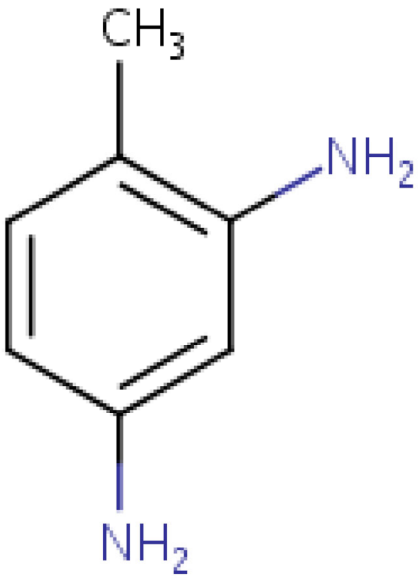
Acronyms & Abbreviations

Chemical Identity

Synonyms	toluene-2,4-diamine 2,4-diaminotoluene (2,4-TDA) 4-methyl-m-phenylenediamine 3-amino-p-toluidine; 1-methyl-2,4-phenylenediamine
Structural Formula	
Molecular Formula	C7H10N2
Molecular Weight (g/mol)	122.17
Appearance and Odour (where available)	Colourless crystals
SMILES	c1(C)c(N)cc(N)cc1

Import, Manufacture and Use

Australian

No specific Australian use, import, or manufacturing information has been identified.

International

The following international uses have been identified through European Union Registration, Evaluation and Authorisation of Chemicals (EU REACH) dossiers; the Organisation for Economic Cooperation and Development Screening information data set International Assessment Report (OECD SIAR); Galleria Chemica; and the US National Library of Medicine's Hazardous Substances Data Bank (HSDB).

The chemical has reported commercial use:

- in food packaging or food contact use (on the US FDA list of Indirect Additives Used in Food Contact Substances in the following category: '177.2600: Rubber articles intended for repeated use').

The chemical has reported site-limited use:

- as an intermediate in the manufacturing of toluene diisocyanate (TDI) ;
- in the preparation of impact resins, polyamides, antioxidants, hydraulic fluids, urethane foams, fungicide stabilisers and photographic developers;
- in the production of dyes used to colour textile, paper, leather and cellulosic fibres; and
- in spirit varnishes, wood stains, indicators in the manufacturing of pigments and as biological stains.

Restrictions

Australian

The chemical is not listed in the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP). However, there is a group entry in Schedule 6 and Appendix C of the SUSMP that includes this chemical:

Schedule 6:

- 'TOLUENEDIAMINE not elsewhere specified in these Schedules:

(a) in hair dye preparations except when the immediate container and primary pack are labelled with the following statements: KEEP OUT OF REACH OF CHILDREN, and WARNING – This product contains ingredients which may cause skin irritation to certain individuals. A preliminary test according to the accompanying directions should be made before use. This product must not be used for dyeing eyelashes or eyebrows; to do so may be injurious to the eye. written in letters not less than 1.5 mm in height; or

(b) in eyelash and eyebrow tinting products when the immediate container and primary pack are labelled with the following statement: WARNING – This product contains ingredients which may cause skin irritation to certain individuals, and when used for eyelash and eyebrow tinting may cause injury to the eye. A preliminary test according to the accompanying directions should be made before use. written in letters not less than 1.5 mm in height.'

Schedule 6 chemicals are labelled with Poison. These are substances with a moderate potential for causing harm, the extent of which can be reduced by using distinctive packaging with strong warnings and safety directions on the label.

Appendix C:

- 'TOLUENEDIAMINE in preparations for skin colouration and dyeing of eyelashes or eyebrows except when included in Schedule 6.'

Appendix C chemicals are substances of such danger to health as to warrant prohibition of sale, supply and use.

International

The chemical is listed on the following (Galleria Chemica):

- Association of South East Asian Nations (ASEAN) Cosmetic Directive Annex II Part 1: List of substances which must not form part of the composition of cosmetic products;
- EU Cosmetics Regulation 1223/2009 Annex II—List of substances prohibited in cosmetic products;
- New Zealand Cosmetic Products Group Standard—Schedule 4: Components cosmetic products must not contain—Table 1;5
- Health Canada List of prohibited and restricted cosmetic ingredients (The Cosmetic Ingredient 'Hotlist'); and
- Thailand Cosmetic Act—Prohibited Substances.

The chemical is also prohibited in the formulation of hair dye products in the US since 1971 (Galleria Chemica).

The Resolution ResAP(2008)1 on requirements and criteria for the safety of tattoos and permanent make-up (Council of Europe, 2008) lists this chemical under the aromatic amines which should not be present in tattoos and permanent make-up products nor released from azo colourants.

Existing Work Health and Safety Controls

Hazard Classification

The chemical is classified as hazardous, with the following risk phrases for human health in the Hazardous Substances Information System (HSIS) (Safe Work Australia):

T; R25 (acute toxicity)

Xn; R21 (acute toxicity)

Xn; R48/22 (repeated dose toxicity)

Xi; R43 (sensitisation)

Carc. Cat. 2; R45 (carcinogenicity)

Muta. Cat. 3; R68 (mutagenicity)

Repr. Cat. 3; R62 (reproductive toxicity)

Exposure Standards

Australian

No specific exposure standards are available.

International

No specific exposure standards are identified.

Health Hazard Information

The chemical is a primary component of the toluenediamine (TDA) commercial mixture. TDA (CAS No. 25376-45-8) is formed by 80 % 2,4-TDA (CAS No. 95-80-7) and 20 % 2,6-TDA (CAS No. 823-40-5).

Toxicokinetics

The metabolism of the chemical has been investigated in animal studies.

The chemical is almost completely absorbed when administered orally to rats. It is well absorbed through the skin at 53 % in monkeys and 24 % in humans (EU RAR, 2008; REACH, 2013). In rats, the major target tissues are liver and kidneys, following oral (300 mg/kg bw) or intraperitoneal (77 mg/kg bw) administration (EU RAR, 2008).

Only 0.1–3.0 % of the administered dose in rats and guinea pigs is excreted in the unchanged form. The major part of the absorbed dose is metabolised by oxidation or acetylation of the side groups. Major metabolites include: 4-acetylamino-2-aminotoluene; 2,4-diacetylaminotoluene; and 4-acetylamino-2-aminobenzoic acid in the rat; and 4-acetylamino-2-aminobenzoic acid; 4-acetylamino-2-aminobenzoic acid and 2,4-diacetylaminobenzoic acid in the mouse. Other metabolites such as alphahydroxy-2,4-diacetylaminotoluene and alpha-hydroxy-2,4-diaminotoluene have also been identified (EU RAR, 2008).

The primary route of excretion is the urine (64–72 % in rats), with faecal elimination accounting for the majority of the remainder (22–31 % in rats) (REACH, 2013). The urinary elimination half-life was 4.6 hours for a 3 mg/kg bw dose and eight hours for a 60 mg/kg bw dose in rats. According to several studies in mice and rats, the renal elimination takes up to 48 hours to complete in both species, but is more rapid and effective in mice (92 % of the intraperitoneally injected dose eliminated in 48 hours) (EU RAR, 2008).

Acute Toxicity

Oral

The chemical is classified as hazardous with the risk phrase ‘Toxic if swallowed’ (T; R25) in HSIS (Safe Work Australia). The available data on Wistar rats (median lethal dose (LD50) = 73 mg/kg bw in females and 136 mg/kg bw in males) support this classification. Reported signs of toxicity in rats include poor general appearance, enhanced diuresis (large volume of urine excretion), sedation, diarrhoea and loss of body weight (EU RAR, 2008).

Dermal

The chemical is classified as hazardous with the risk phrase ‘Harmful in contact with skin’ (Xn; R21) in HSIS (Safe Work Australia). The available data on rats (LD50 = 1200 mg/kg bw; EU RAR, 2008) support this classification. Reported signs of toxicity include slight hyperaemia (excessive blood) in the lungs, discolouration of lungs and liver and increased concentrations of methaemoglobin.

Inhalation

No data are available on the chemical alone. Based on the data available for toluenediamine (TDA, CAS No. 25376-45-8), the chemical is not considered to cause acute inhalation toxicity.

In a non-guideline study, rats and mice were exposed to 5.57 mg/L of TDA vapour–dust mixture (with a high amount of particles) for four hours. During the observation period of 14 days, no mortalities were recorded. Reported signs of toxicity included laboured breathing (EU RAR, 2006; OECD, 2006).

Corrosion / Irritation

Skin Irritation

Based on the available data, the chemical is not considered to be a skin irritant.

According to a study performed in accordance with OECD Test Guideline (TG) 404, the chemical produced no skin irritation (EU RAR, 2008). A single dose of 500 mg was applied to the skin of three New Zealand White rabbits for four hours—none of the rabbits exhibited signs of irritation. The mean erythema and oedema scores were zero.

Another study performed on rabbits using 500 mg of the chemical for 24 hours' exposure indicated irritation and blisters on the skin. However, the methodology and recording of results are insufficiently described (WHO, 1987), and the exposure duration is not consistent with the OECD TG 404.

Eye Irritation

Based on the available data, the chemical is not considered to be an eye irritant.

According to a study performed in accordance with OECD TG 405, the chemical produced no significant eye irritation (EU RAR, 2008). A single dose of 100 mg was instilled into the eyes of three rabbits and the effects were recorded for 72 hours. The only effect reported was a slight conjunctival redness (maximum score = 1).

Sensitisation

Skin Sensitisation

The chemical is classified as hazardous with the risk phrase ‘May cause sensitisation by skin contact’ (R43) in HSIS (Safe Work Australia). The data available support this classification.

According to a Magnusson Kligman study (OECD TG 406) conducted in guinea pigs with the chemical used at 0.5 % for intradermal induction and 50% for topical induction, 10/10 animals had a positive reaction to a 25% concentration and 5/10 to a 5 % concentration of the chemical at the challenge phase (EU RAR, 2008).

A local lymph node assay (LLNA) following OECD TG 429 indicated an EC3 (estimated concentration needed to produce a stimulation index of three) of 19 % for toluenediamine. The test substance is a weak skin sensitiser (Vanoirbeek et al., 2009).

Repeated Dose Toxicity

Oral

The chemical is classified as hazardous with the risk phrase 'Harmful: Danger of serious damage to health by prolonged exposure if swallowed' (R48/22) in HSIS (Safe Work Australia). The data available support this classsification.

The following effects are reported in repeated dose animal studies conducted with the chemical:

- Short-term studies (less than 90 days): The liver is identified as the main target organ for both rats and mice. Toxic effects include decreased body weights, liver damage, increased liver weights (OECD, 2006), decreased blood urea nitrogen levels and centrilobular necrosis in the liver (EU RAR, 2008).
- Long-term studies (between 36 weeks and two years): The observed toxic effects include (but are not limited to) decreased body weights, increased liver weights, increased mortality rates and atrophy of the spleen. Serious damage is recorded for the liver in particular: cholangiofibrosis (fibrosis of the bile ducts), cirrhosis, areas of fatty degeneration, focal necrosis of hepatocytes, cystic bile ducts, cholangitis (infected bilary tract) (EU RAR, 2008). In a two-year study in rats (NCI, 1979), oral doses of 5.9 and 13 mg/kg bw/day induced general hepatotoxicity (lipidosis, necrosis of hepatocytes and severe cell degeneration), kidney lesions, decreased body weight and survival rate. A lowest observed adverse effect level (LOAEL) of 5.9 mg/kg bw/day was reported in rats based on toxic effects in the liver and kidneys at the lowest dose tested (EU RAR, 2008).

Dermal

No data are available.

Inhalation

No data are available.

Genotoxicity

The chemical is classified as hazardous—Category 3 mutagenic substance —with the risk phrase 'Possible risk of irreversible effect' (R68) in HSIS (Safe Work Australia). The data available support this classification.

The following results are reported for the in vitro studies conducted using the chemical (EU RAR, 2008; REACH, 2013):

- Bacterial gene mutation test (according to or similar to OECD TG 471): positive in the presence of metabolic activation in most studies with doses from 20 µg/plate up to 10000 µg/plate.
- Mammalian gene mutation assay (similar to OECD TG 476): negative with and without metabolic activation with doses up to 6000 µg/mL and 10000 µg/mL, respectively.
- Chromosome aberration test (similar to OECD TG 473): positive with and without metabolic activation with doses from 98.5 µg/mL up to 1227 µg/mL, with toxic effects starting at 490.8 µg/mL.
- Sister chromatid exchange assay (similar to OECD TG 479): positive with and without metabolic activation with doses from 468 µg/mL to 4680 µg/mL.
- Unscheduled DNA synthesis (UDS) test (similar to OECD TG 482) in mammalian hepatocytes: positive without metabolic activation with doses from 1.2 µg/mL.
- DNA strand breaks test (non guideline) in mammalian cells: positive with and without metabolic activation with doses from 12.3 µg/mL to 367 µg/mL.
- DNA adduct test (non guideline) in mammalian cells: positive with and without metabolic activation from 3.6 µg/mL to 36.6 µg/mL.

The results of the most relevant in vivo tests are summarised below (EU RAR, 2008; REACH, 2013):

- Micronucleus test in rats (similar to OECD TG 474): negative with oral or intraperitoneal doses up to 240 mg/kg bw.
- Transgenic mouse assays (similar to OECD TG 488): oral doses of 80 mg/kg bw/day for 10 days, or 123 mg/kg bw/day for 30–90 days induced mutations in the liver.
- Sister chromatid exchange assay in mice (non-guideline): positive after intraperitoneal injection of the chemical at 9 and 18 mg/kg bw.

- UDS test in rats (similar to OECD TG 486): DNA damage (positive) in rat liver cells with single doses of 150 and 300 mg/kg bw.
- Dominant lethal test in mice (similar to OECD TG 478): negative after both oral and intraperitoneal administration of the chemical at 40 mg/kg bw.
- Sex-linked recessive lethal test in Drosophila melanogaster (similar to OECD TG 477): positive following oral administration or injection of the chemical at 611 and up to 2443 µg/mL.

Most in vitro studies gave positive results. Apart from the dominant lethal test in mice, the in vivo studies listed above demonstrate the ability of the chemical to induce mutations in mice and rats, supporting the existing hazard classification. Although the sex-linked recessive lethal test in Drosophila was positive for germ cell mutations—a major consideration for upgrading the hazard classification, mammalian/rodent in vivo studies, particularly the dominant lethal test in mice, do not provide sufficient information to determine whether the chemical reached the germ cells to cause the mutations.

Carcinogenicity

The chemical is classified as hazardous as a Category 2 carcinogen with the risk phrase 'May cause cancer' (T; R45) in HSIS (Safe Work Australia). The available data support this classification.

The International Agency for Research on Cancer (IARC) has classified the chemical as a Group 2B carcinogen (possibly carcinogenic to humans based on sufficient evidence of carcinogenicity in animal studies) (IARC, 1978).

The key study for assessment of carcinogenicity is a two-year feeding study of the chemical in groups of rats and mice (OECD TG 453 with some deviations). The chemical was found carcinogenic for F344 rats, inducing hepatocellular carcinomas, neoplastic nodules in both sexes and adenomas of the mammary glands in females. Mice were less sensitive to the chemical, but oral administration induced hepatocellular carcinomas in female mice (NCI, 1979). The LOAEL was reported as 5.9 mg/kg bw/day, based on increased tumor incidence in the liver (male and female rats, female mice) and in the mammary gland (female rats) at this lowest tested dose (EU RAR, 2008).

Other studies conducted on rodents show that oral administration of the chemical is associated with tumor development in the liver, lungs and mammary glands. The overall results clearly indicate that the chemical is carcinogenic when administered orally. There are no relevant data available for the other routes of exposure (inhalation and dermal).

Given the positive results for mutagenicity in various systems, the mechanism of tumor induction may be related to the genotoxic potential of the chemical (see **Genotoxicity** section) (EU RAR, 2008; REACH, 2013).

Reproductive and Developmental Toxicity

The chemical is classified as hazardous—Category 3 substance toxic to reproduction—with the risk phrase 'Possible risk of impaired fertility' (Xn; R62) in HSIS (Safe Work Australia). The data available, particularly in male rats, support this classification.

The toxicity of the chemical for reproductive functions was investigated through a series of tests conducted on Sprague Dawley male rats by oral administration of the chemical (non-guideline studies). A preliminary study showed that feeding male rats at 0.1 % concentration of the chemical for nine weeks (daily intake average = 50 mg/kg bw/day) resulted in reproductive failure characterised by body and testicular weight losses, and arrested spermatogenesis (EU RAR, 2008).

Further studies were focused on the mechanism of toxicity in male rats. After 10 weeks of treatment with the chemical at 5 or 15 mg/kg bw/day, spermatogenesis was clearly inhibited at the highest dose, possibly due to structural damage to Sertoli cells. The LOAEL was 5 mg/kg bw/day due to the observation of reduced sperm reserves at this dose (EU RAR, 2008).

In a screening assay, pregnant mice were orally administered the chemical at 150 mg/kg bw/day for seven days. The toxic effects reported include significantly reduced mean body weights, maternal toxicity (mortality 17/50) and significant reduction in live litters (EU RAR, 2008; REACH, 2013).

Risk Characterisation

Critical Health Effects

The critical health effects for risk characterisation include:

- systemic long-term effects—carcinogenicity, mutagenicity and reproductive toxicity;
- systemic acute effects—acute toxicity by oral and dermal routes; and
- local effects—skin sensitisation.

The chemical may also cause harmful effects following repeated oral exposure.

Public Risk Characterisation

Given the main use of the chemical as an intermediate to manufacture other chemicals, it is unlikely that the public will be exposed to the chemical. It is expected that the chemical will not be present in final consumer products, although it is likely to have properties that would make it useful for applications such as hair dyes.

Many countries such as USA, Canada, New Zealand and the European Union have prohibited the use of this chemical in cosmetics. In Australia, a chemical group (toluenediamines) including this chemical is listed on Schedule 6 and Appendix C of the SUSMP, with restriction/prohibition of its use in specific cosmetics products. The Schedule 6 entry in the SUSMP allows toluenediamines to be included in hair dye preparations and in eyelash and eyebrow tinting products with specific requirements.

Considering the hazard properties of this chemical, it will cause unreasonable risks to consumers if used in hair dyes and eyelash and eyebrow tinting products.

The chemical may be included in food packaging or food contact use according to the US FDA List of "Indirect" Additives Used in Food Contact Substances—Rubber articles intended for repeated use. If this chemical is used in food contact substances, it is unlikely that leaching from the articles will be at sufficient concentrations to cause an unreasonable risk to consumers.

Occupational Risk Characterisation

Given the critical health effects (carcinogenicity, reproductive toxicity, skin sensitisation), the chemical may pose an unreasonable risk to workers unless adequate control measures to minimise exposure to the chemical are implemented. Based on the available data, the hazard classification in HSIS is considered appropriate.

NICNAS Recommendation

Further risk management is required. Sufficient information is available to recommend that risks to public health and safety from the potential use of the chemical in hair dye and eyebrow/eyelash tinting products be managed through changes to poisons scheduling, and risks for workplace health and safety be managed through classification and labelling.

Assessment of the chemical is considered to be sufficient provided that risk management recommendations are implemented and all requirements are met under workplace health and safety and poisons legislation as adopted by the relevant state or territory.

Regulatory Control

Public Health

At present, the chemical falls within the scope of the listing of toluenediamines in Schedule 6 of the SUSMP for use in hair dye preparations and in eyelash and eyebrow tinting products under specified conditions. Considering the severe health effects possible from exposure to this chemical (i.e. skin sensitisation, genotoxicity, carcinogenicity and fertility effects) it is recommended that this chemical be excluded from this group entry in Schedule 6 of the SUSMP. A separate Appendix C entry is recommended to prohibit the use of this chemical in hair dye preparations and in eyelash and eyebrow tinting products.

Work Health and Safety

The chemical is recommended for classification and labelling under the current approved criteria and adopted GHS as below. This assessment does not consider classification of physical hazards and environmental hazards.

Hazard	Approved Criteria (HSIS)[a]	GHS Classification (HCIS)[b]
Acute Toxicity	Toxic if swallowed (T; R25)* Harmful in contact with skin (Xn; R21)*	Toxic if swallowed - Cat. 3 (H301) Harmful in contact with skin - Cat. 4 (H312)
Sensitisation		

Hazard	Approved Criteria (HSIS)[a]	GHS Classification (HCIS)[b]
	May cause sensitisation by skin contact (Xi; R43)*	May cause an allergic skin reaction - Cat. 1 (H317)
Repeat Dose Toxicity	Harmful: Danger of serious damage to health by prolonged exposure if swallowed (Xn; R48/22)*	May cause damage to organs through prolonged or repeated exposure - Cat. 2 (H373)
Genotoxicity	Muta. Cat 3 - Possible risk of irreversible effects (Xn; R68)*	Suspected of causing genetic defects - Cat. 2 (H341)
Carcinogenicity	Carc. Cat 2 - May cause cancer (T; R45)*	May cause cancer - Cat. 1B (H350)
Reproductive and Developmental Toxicity	Repro. Cat 3 - Possible risk of impaired fertility (Xn; R62)*	Suspected of damaging fertility - Cat. 2 (H361f)

[a] Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(2004)].

[b] Globally Harmonized System of Classification and Labelling of Chemicals (GHS) United Nations, 2009. Third Edition.

[*] Existing Hazard Classification. No change recommended to this classification

Advice for industry

Control measures

Control measures to minimise the risk from dermal and inhalation exposure to the chemical should be implemented in accordance with the hierarchy of controls. Approaches to minimise risk include substitution, isolation and engineering controls. Measures required to eliminate or minimise risk arising from storing, handling and using a hazardous chemical depend on the physical form and the manner in which the chemical is used. Examples of control measures, which may minimise the risk include, but are not limited to:

- using closed systems or isolating operations;
- using local exhaust ventilation to prevent the chemical from entering the breathing zone of any worker;
- health monitoring for any worker who is at risk of exposure to the chemical if valid techniques are available to monitor the effect on the worker's health;
- air monitoring to ensure control measures in place are working effectively and continue to do so;
- minimising manual processes and work tasks through automating processes;
- work procedures that minimise splashes and spills;
- regularly cleaning equipment and work areas; and
- using protective equipment that is designed, constructed, and operated to ensure that the worker does not come into contact with the chemical.

Guidance on managing risks from hazardous chemicals are provided in the *Managing risks of hazardous chemicals in the workplace—Code of practice* available on the Safe Work Australia website.

Personal protective equipment should not solely be relied upon to control risk and should only be used when all other reasonably practicable control measures do not eliminate or sufficiently minimise risk. Guidance in selecting personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

Obligations under workplace health and safety legislation

Information in this report should be taken into account to assist with meeting obligations under workplace health and safety legislation as adopted by the relevant state or territory. This includes, but is not limited to:

- ensuring that hazardous chemicals are correctly classified and labelled;

- ensuring that (material) safety data sheets ((m)SDS) containing accurate information about the hazards (relating to both health hazards and physicochemical (physical) hazards) of the chemical are prepared; and
- managing risks arising from storing, handling and using a hazardous chemical.

Your work health and safety regulator should be contacted for information on the work health and safety laws in your jurisdiction.

Information on how to prepare an (m)SDS and how to label containers of hazardous chemicals are provided in relevant codes of practice such as the *Preparation of safety data sheets for hazardous chemicals— Code of practice* and *Labelling of workplace hazardous chemicals—Code of practice*, respectively. These codes of practice are available from the Safe Work Australia website.

A review of the physical hazards of the chemical has not been undertaken as part of this assessment.

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