Benzenesulfonamide, N-chloro-4-methyl-, sodium salt: Human health tier II assessment

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CAS Number: 127-65-1

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.

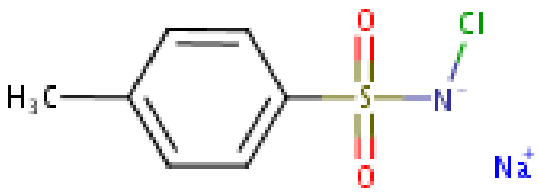
This chemical or group of chemicals are being assessed at Tier II because the Tier I assessment indicated that it needed further investigation.

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

Disclaimer

Acronyms & Abbreviations

Chemical Identity

Synonyms	Chloramine T sodium p-toluenesulfonchloramide p-toluenesulfonamide, N-chloro-, sodium salt tosylchloramide sodium tosylchloramidnatrium
Structural Formula	
Molecular Formula	C7H8ClNO2S.Na
Molecular Weight (g/mol)	227.65
Appearance and Odour (where available)	White or slightly yellow crystals or crystalline powder with a slight odour of chlorine
SMILES	c1(S(=O)(=O)N{-}(.[Na]{+})Cl)ccc(C)cc1

Import, Manufacture and Use

Australian

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

The following non-industrial use has been identified in Australia (Australian Pesticides and Veterinary Medicines Authority—APVMA).

The chemical is an active constituent in agricultural and/or veterinary products that does not require evaluation ('chemicals that may not have been primarily developed as agricultural chemicals or are of low significance ... do not have an active constituent approval number'—APVMA).

International

The following international uses have been identified through Galleria Chemica; the Substances and Preparations in Nordic countries (SPIN) database; the European Commission Cosmetic Ingredients and Substances (CosIng) database; the United States (US) Personal Care Products Council International Nomenclature of Cosmetic Ingredients (INCI) Dictionary; the US Environmental Protection Agency's Aggregated Computer Toxicology Resource (ACToR); the US National Library of Medicine's Hazardous Substances Data Bank (HSDB); and various international assessments (a 1999 report from the European Agency for the Evaluation of Medicinal Products (EMA); a 2002 review of toxicological literature by the National Toxicology Program (NTP); and a 2008 report from a joint meeting of the Food and Agricultural Organization (FAO) and the World Health Organization (WHO)).

The chemical has reported cosmetic use as an antimicrobial or biocide or preservative.

The chemical has reported domestic use as a cleaning or washing or bleaching agent.

The chemical has reported commercial uses as a:

- preservative for masonry, fibre, leather, rubber and polymerised materials; and
- conductive agent.

The chemical has reported site-limited uses, including as:

- a bleaching agent for textiles and in book conservation;
- a deodorising agent; and
- an absorbent or adsorbent.

The chemical has reported non-industrial uses, including as:

- a drinking water disinfecting agent;
- a disinfectant in food production and food processing;
- an antiseptic or antibacterial in medicines;
- a veterinary biocidal agent; and
- a component of pesticides, algicides, bactericides or germicides.

Restrictions

Australian

No known restrictions have been identified.

International

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

- Association of Southeast Asian Nations (ASEAN) Cosmetic Directive Annex III—List of substances which cosmetic products must not contain except subject to restrictions and conditions laid down (0.20 % maximum authorised concentration in the finished cosmetic product);
- EU Cosmetics Regulation 1223/2009 Annex III—List of Substances which cosmetic products must not contain except subject to the restrictions laid down (0.2 % maximum concentration in ready for use preparation as an antimicrobial);
- Health Canada List of prohibited and restricted cosmetic ingredients (The Cosmetic Ingredient ‘Hotlist’);
- New Zealand Cosmetic Products Group Standard—Schedule 5: Components Cosmetic Products Must Not Contain Except Subject to the Restrictions and Conditions Laid Down (0.2 % maximum authorised concentration in the finished cosmetic product as a preservative);
- US FDA Requirements for Specific Standardized Beverages—Bottled water—Allowable levels for residual disinfectants and disinfection by products (limit of 4.0 mg/L for residual chloramine disinfectants); and
- Council of Europe Resolution AP (92) 2 on control of aids to polymerisation for plastic materials and articles—Limits for basic polymers (limit of 1 mg/kg for thiols, sulfonic acids and other sulfur compounds (as S in the organic moiety)).

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):

- Xn; R22 (acute toxicity)
- R31 (contact with acid liberates toxic gas)
- C; R34 (corrosive)
- Xn; R42 (sensitisation)

Exposure Standards

Australian

No specific exposure standards are available.

International

The following exposure standard is identified (Galleria Chemica).

An exposure limit of 1 mg/m^3 time weighted average (TWA) in Bulgaria.

Health Hazard Information

Toxicokinetics

The chemical was administered to male Wistar rats at 30 mg/kg intravenously (i.v.) or 100 mg/kg orally and sequential blood samples were taken for chemical analysis. The half-life of distribution was determined to be 0.12 and 0.42 hours for i.v. and oral dosing, respectively. The half-life of elimination was determined to be 1.41 and 1.98 hours for i.v. and oral dosing, respectively. The plasma clearance rate was approximately 0.15 L/hour (NTP, 2002).

The chemical was administered to male Wistar rats at 100 mg/kg orally or 5 mg/kg intraperitoneally (i.p.). Sequential blood samples were taken, and brain was dissected, for chemical analysis. It was reported that the chemical was rapidly absorbed peripherally, but also entered the central nervous system and was stored in the brain. The neurotransmitter serotonin (5-HT) was significantly reduced in the striatum and frontal cortex of treated rats (NTP, 2002).

Acute Toxicity

Oral

The chemical is classified as hazardous with the risk phrase ‘Harmful if swallowed’ (Xn; R22) in the HSIS (Safe Work Australia). The available data support this classification.

The median lethal oral dose (LD50) is 935 mg/kg bw in rats and 1100 mg/kg bw in mice. Reported sublethal signs of toxicity included lethargy, gastric inflammation and bleeding, and intestinal haemorrhage (EMA, 1999; NTP, 2002; Galleria Chemica; HSDB).

Dermal

Based on the limited available data, the chemical is considered to have low acute dermal toxicity.

The dermal LD50 in rabbits was variously reported to be >154 mg/kg bw (highest dose tested) and >2000 mg/kg bw (NTP, 2002; Galleria Chemica).

Inhalation

Based on the limited available data, the chemical is considered to have low acute inhalation toxicity.

The median lethal concentration (LC50) was variously reported to be >0.275 mg/L (maximum attainable concentration) and >4.2 mg/L (highest concentration tested) in rats (NTP, 2002; Galleria Chemica).

Observation in humans

The reported probable oral lethal dose is 500–5000 mg/kg bw (NTP, 2002).

Corrosion / Irritation

Corrosivity

The chemical is classified as hazardous with the risk phrase ‘Causes burns’ (C; R34) in the HSIS (Safe Work Australia). The available animal data are insufficient to support the existing hazard classification. However, human observations indicate irritation from oral, dermal, inhalation and ocular routes of exposure. While the available data do not support this classification, in the absence of more comprehensive information, there is insufficient evidence to support a recommendation to amend this classification.

The chemical was reported to be corrosive to skin (EMA, 1999). No further details were available.

In a dermal exposure study in New Zealand White rabbits (n = 6), 0.5 g of the chemical was moistened and applied to intact skin (duration not specified). Slight oedema, eschar formation and scar tissue formation was observed in 2/6 rabbits, but no irritation (in 2/6 animals) or slight but reversible irritation (in 2/6 animals) was observed in other animals (HSDB).

Corrosive chemicals are also considered to cause irreversible effects on the eyes. The chemical was reported to be 'an extreme irritant for the ocular mucosa' (EMA, 1999). No further details were available.

In a study in rabbits (n = 6), 0.1 mL of an 8 % weight per volume (w/v) solution of the chemical was administered into one conjunctival sac per animal. This solution was reported to be mildly irritating to the eye. Mild eye irritation was also observed in rabbits in a Draize test using a 10 % solution of the chemical, but no eye irritation was observed using a 0.5 % solution of the chemical (HSDB).

Observation in humans

Oral exposure to the chemical irritated the gastrointestinal tract, with symptoms including nausea, vomiting and diarrhoea. Dermal exposure can induce redness, itching and pain. Inhalation exposure irritates the mucous membranes of the upper respiratory tract, with symptoms including burning sensation, coughing, wheezing, laryngitis, dyspnoea (shortness of breath), sore throat, bronchitis, pneumonitis (alveolar inflammation) and pulmonary oedema. Ocular exposure irritates the eyes and can induce pain and conjunctivitis (NTP, 2002). Doses or concentrations of the chemical causing these effects were not available.

Sensitisation

Respiratory Sensitisation

The chemical is classified as hazardous with the risk phrase ‘May cause sensitisation by inhalation’ (R42) in the HSIS (Safe Work Australia). No animal data are available. Data from one clinical study and various human case studies support this classification (see **Observation in humans** below).

Skin Sensitisation

Based on the available animal data and predictions from the Quantitative Structure-Activity Relationship (QSAR) models (Optimized Approach based on Structural Indices Set–TIssue MEtabolism Simulator (OASIS–TIMES); version 2.27.17.6), the chemical is considered to be a strong skin sensitiser, warranting hazard classification (see **Recommendation** section). Data from human case studies support the classification (see **Observation in humans** below).

Positive results for skin sensitisation were observed in the guinea pig maximisation test (GPMT), the local lymph node assay (LLNA) and the Buehler occluded test (Basketter and Scholes, 1992 and Kimber et al., 1994 cited in NTP, 2002). No study details were available.

In a mouse LLNA using the chemical (experimental details not available), the estimated concentration needed to produce a three-fold increase in lymphocyte proliferation (EC3) was reported to be 0.4 % (Organization for Economic Cooperation and Development (OECD) Toolbox; version 3.3.5.17).

In an in vitro skin sensitisation assay (human cell line activation test, h-CLAT) using the chemical (experimental details not available), expression of the cell surface markers CD86 and CD54 was reported as positive indicating the potential to induce skin sensitisation (OECD Toolbox; version 3.3.5.17).

QSAR modelling using OASIS–TIMES predicted positive results for skin sensitisation for the chemical and its metabolites. The parent chemical and its metabolites were in the applicability domain of the QSAR model used, increasing the reliability of the positive prediction.

Observation in humans

A single-blind, placebo controlled clinical study was undertaken in six people with a history of asthma and rhinitis (inflammation of the nasal mucous membrane) considered to be induced by the chemical (Chloramine T). There were two control groups who were not sensitised to the chemical—seven subjects with symptoms of asthma and rhinitis due to allergic hypersensitivity to other allergens, and six healthy subjects. All subjects were exposed to the chemical or placebo (dose information not available) and nasal washings were examined 30 minutes, four hours and 24 hours after exposure, and compared with baseline nasal washings. In nasal washings from subjects with prior Chloramine T-induced allergy, there were significantly increased leukocytes (white blood cells; eosinophils and basophils), significantly increased albumin, and significantly increased concentrations of tryptase and eosinophilic cationic protein compared with both control groups. Asthmatic reactions were also observed in all previously-sensitised subjects (Palczynski et al., 2003).

Several case studies in humans have also documented respiratory and/or skin sensitisation responses in workers exposed to the chemical.

In seven brewery workers who used the chemical at 0.25–2 % as a sterilising agent, severe asthmatic symptoms developed between a few days and up to three years after the initial exposure. Once sensitisation had occurred, the latency period for experiencing symptoms upon exposure was 10 minutes and effects lasted between one hour and 30 days. Symptoms included lacrimation (tear production), rhinorrhoea (nasal discharge), cough, nausea, wheezing and dyspnoea. Sensitisation was confirmed by skin-prick tests using the chemical at 0.1, 1 and 10 mg/mL, where positive wheal and flare reactions to the chemical were observed at all concentrations, but no reaction to this level of chemical exposure was seen in unexposed controls (Bourne et al., 1979).

In five workers exposed to the chemical as a disinfectant, respiratory symptoms developed. Inhalation provocation testing performed in three of the workers induced immediate asthmatic bronchial obstruction with late-type asthmatic reactions hours later in one worker and late-type asthmatic reactions 4–8 hours later in two workers; symptoms lasted for hours to days in all tested workers. In skin-prick testing performed in four of the workers, immediate positive wheal and flare reactions were observed, also with late-type infiltrative reactions (Dijkman et al., 1981; cited in HSDB).

A 36-year-old female cleaner developed occupational asthma (sneezing, coughing, dyspnoea) following exposure to the chemical at 10 % in a disinfectant spray solution. Provocation testing using the chemical at 2 µg induced rhinorrhoea, coughing, dyspnoea and wheezing. The cleaner also showed positive results in a skin-prick test using the chemical (Kujala et al., 1995).

One male dairy worker developed rhinitis and bronchial asthma four years after the initial exposure to the chemical. Inhalation testing provoked immediate and late bronchial obstruction. Positive results in skin-prick testing were also reported with exposure to the chemical at 10 mg/mL (Blasco et al., 1992; cited in HSDB).

A 38-year-old female nurse had eczema on her hands and forearms. By patch-testing, it was determined that she had become sensitised to the chemical, while using an antiseptic product containing the chemical for cleansing patients' burns (Lombardi et al., 1989).

A 48-year-old female hospital bath attendant with existing hand dermatitis developed swelling of her exposed wrists and forearms, sneezing and nasal blockage upon contact with the chemical when using a liquid disinfectant. Skin-prick testing produced a positive and dose-dependent reaction to the chemical. Provocation testing using diluted and undiluted disinfectant on recently pricked or intact skin, respectively, caused positive reactions. The worker was diagnosed with chloramine T-induced allergic contact urticaria (hives) (Kanerva et al., 1997).

Repeated Dose Toxicity

Oral

Based on the available data, the chemical is not considered to cause severe effects from repeated oral exposure. Although there were kidney effects in rats within the classifiable range for repeated dose oral toxicity, the available data do not indicate major functional or histopathological changes in the kidneys to warrant hazard classification.

In a 90-day study, Wistar rats (n = 10/sex/dose) were administered the chemical in diet at doses approximately equivalent to 0, 5, 15, 50 or 150 mg/kg bw/day. Relative kidney weights were significantly increased in rats exposed at 50 and 150 mg/kg bw/day. In female rats exposed at 50 and 150 mg/kg bw/day, there were also increased incidences and severity of calcareous (containing calcium carbonate) deposits in the kidneys. Haematology, blood chemistry and urinalysis parameters were not affected. A no observed adverse effect level (NOAEL) of 15 mg/kg bw/day was reported (EMA, 1999; Galleria Chemica), but effects at higher doses were not considered to reflect severe systemic toxicity.

In a 28-day study, male and female Wistar rats (numbers not available) were administered the chemical in diet at doses approximately equivalent to 0, 150, 500 or 1500 mg/kg bw/day. Body weight was significantly reduced in both sexes at the highest dose, and in males only at 500 mg/kg bw/day. In rats exposed to the chemical at ≥500 mg/kg bw/day, food intake and food efficiency were reduced; leukocyte count was slightly increased; and the livers were pale coloured. Increased relative liver and kidney weights were observed in males and females in some treatment groups (including the lowest dose) but these were not associated with histopathological changes (EMA, 1999; Galleria Chemica; HSDB).

Dermal

Based on the limited available data, the chemical is not considered to cause severe systemic effects from repeated dermal exposure.

In a dermal study in male and female New Zealand White rabbits (numbers not available), the chemical was applied to the skin at 0, 25, 75 or 225 mg/kg bw/day for six hours per day, five days per week for three weeks (OECD TG not indicated). Local irritation and histological changes were observed in the skin of rabbits exposed at ≥75 mg/kg bw/day. Body weight gain, food intake, organ weights, blood chemistry and urinalysis were not affected. An NOAEL of 25 mg/kg bw/day for local effects was reported (Galleria Chemica).

Inhalation

Based on the available data, the chemical is not considered to cause severe effects from repeated inhalation exposure, apart from those resulting from the irritant effects of the chemical. Although there were histopathological lesions in the lungs of rats within the classifiable range for repeated dose inhalation toxicity, the available data do not indicate functional changes in the lungs or systemic toxicity effects to warrant hazard classification. The chemical is classified as a corrosive, indicating irritation to the respiratory tract.

In an inhalation study, Sprague Dawley (SD) rats (n = 5/sex/dose) were exposed to the chemical as a mist aerosol at 0, 0.2, 0.9 or 4.0 mg/m^3 (equivalent to 0, 0.0002, 0.0009 and 0.004 mg/L) for six hours per day, five days per week for 28 days (OECD TG not indicated). Histopathological lesions in the lungs (including inflammation in the terminal and perivascular areas of the lungs, and alveolar epithelial hyperplasia) were observed at doses ≥0.9 mg/m^3 in males and at the highest dose only in females. In males, there were increased white blood cells (monocytes) and increased serum triglycerides at 0.2 and 0.9 mg/m^3. There was significantly increased DNA damage (by comet assay) in liver, spleen and lung tissues of exposed rats at doses ≥0.9 mg/m^3 (Shim et al., 2013).

Genotoxicity

Based on the weight of evidence from the available in vitro and in vivo genotoxicity studies, the chemical is not considered to be genotoxic. A well-conducted (according to US EPA guidelines) in vivo micronucleus assay in mice showed negative results with the chemical.

Positive results were reported for one in vitro test, a sister chromatid exchange (SCE) assay in Chinese hamster ovary (CHO) cells exposed to the chemical at 0.1–100 µM for 30 hours (US EPA, 1994; NTP, 2002; HSDB).

Negative results were observed in other in vitro assays using the chemical (EMA, 1999; NTP, 2002; FAO/WHO, 2008; Galleria Chemica; HSDB):

- multiple Ames tests in *Salmonella typhimurium* strains TA98, TA 100, TA1535, TA1537 and TA1538 exposed at 0.2–3600 µg/plate, with or without metabolic activation;
- a DNA repair test in *Escherichia coli* exposed at 0.5–5000 µg/plate, with or without metabolic activation; and
- a gene mutation assay in mouse lymphoma L5178Y cells, with or without metabolic activation.

Positive results were reported in one in vivo test, where SD rats (n = 5/sex/dose) were exposed to the chemical as a mist aerosol at 0, 0.2, 0.9 or 4.0 mg/m^3 for six hours per day, five days per week for 28 days (OECD TG not indicated). There was significantly increased DNA damage (by comet assay) in liver, spleen and lung tissues of exposed rats at doses ≥0.9 mg/m^3 (Shim et al., 2013).

Negative results were reported in three other in vivo assays (EMA, 1999; NTP, 2002; FAO/WHO, 2008; Galleria Chemica):

- a micronucleus assay in bone marrow erythrocytes of Swiss Webster mice exposed to the chemical by oral gavage at 300, 600 or 1200 mg/kg bw/day for two days (GLP compliant; tested according to US EPA guidelines);
- a micronucleus assay in bone marrow erythrocytes of male and female NMRI mice (n = 4–8/group) exposed to the chemical by i.p. injection at 35 or 70 mg/kg bw/day for two days (OECD TG not indicated); and
- a sex-linked recessive lethal test in *Drosophila melanogaster* exposed to the chemical at 25 mM (7 mg/mL) in the diet (OECD TG not indicated).

Carcinogenicity

No data are available.

The chemical contains a structural alert for carcinogenicity. The chemical can potentially cause carcinogenicity via a non-genotoxic mechanism involving methylation of benzenesulfonic ethers (OECD Toolbox; version 3.3.5.17).

Reproductive and Developmental Toxicity

No data are available.

Other health effects

The chemical is classified as hazardous with the risk phrase 'Contact with acids liberates toxic gas' (C; R31) in the HSIS (Safe Work Australia). The chemical is a chlorine releaser, so this classification is appropriate.

Risk Characterisation

Critical Health Effects

The critical health effects for risk characterisation include local effects (corrosivity, skin sensitisation and respiratory sensitisation) and the release of toxic chlorine gas.

The chemical is also harmful acutely by the oral route.

Public Risk Characterisation

There is limited evidence of cosmetic or domestic use of the chemical. Hence, the public risk from this chemical is not considered to be unreasonable.

Occupational Risk Characterisation

Given the critical local health effects, the chemical could pose an unreasonable risk to workers unless adequate control measures to minimise oral, dermal, ocular and inhalation exposure are implemented. The chemical should be appropriately classified and labelled to ensure that a person conducting a business or undertaking (PCBU) at a workplace (such as an employer) has adequate information to determine the appropriate controls.

The data available support an amendment to the hazard classification in the HSIS (Safe Work Australia) (see **Recommendation** section).

NICNAS Recommendation

Assessment of the chemical is considered to be sufficient, provided that the recommended amendment to the classification is adopted, and labelling and all other requirements are met under workplace health and safety and poisons legislation as adopted by the relevant state or territory.

Further risk management is required if this chemical is used in cosmetic and domestic products at high concentrations. The chemical may be recommended for further assessment to evaluate the concentrations and uses in cosmetic and domestic products manufactured or imported into Australia, to identify if an unacceptable risk of exposure exists from this chemical.

Regulatory Control

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 and environmental hazards.

Hazard	Approved Criteria (HSIS)[a]	GHS Classification (HCIS)[b]
Acute Toxicity	Harmful if swallowed (Xn; R22)*	Harmful if swallowed - Cat. 4 (H302)
Irritation / Corrosivity	Causes burns (C; R34)*	Causes severe skin burns and eye damage - Cat. 1B (H314)
Sensitisation	May cause sensitisation by inhalation (Xn, R42)* May cause sensitisation by skin contact (Xi; R43)	May cause allergy or asthma symptoms or breathing difficulties if inhaled - Cat. 1 (H334) May cause an allergic skin reaction - Cat. 1 (H317)
Other Health Effects	Contact with acids liberates toxic gas (R31)*	Contact with acid liberates toxic gas (AUH031)

[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 oral, dermal, ocular 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 that could 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[s], if valid techniques are available to monitor the effect on the worker's health;
- 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 help meet 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.

References

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