Resin acids and rosin acids, manganese salts: Human health tier II assessment

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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	manganese resinate manganese resin acid salts
Structural Formula	No Structural Diagram Available
Molecular Formula	Unspecified
Molecular Weight (g/mol)	Unspecified
Appearance and Odour (where available)	dark brownish-black solid or flesh-coloured powder
SMILES	C(=O)(C1(C)C2C(C)(C3C(C=C(C(C)C)CC3)=CC2)CCC1)O[Mn]OC(=O)C1(C)C2C(C)(C3C(C=C(C(C)C)CC3)=CC2)CCC1

Import, Manufacture and Use

Australian

According to industry information, the chemical has reported domestic and commercial uses in paints, at a concentration of 0.05–0.2 %.

Soluble manganese compounds also have uses in paints, glazes and varnishes as drying agents (NICNASa).

International

Limited information is available.

The chemical has reported potential commercial use in varnishes and oils as a drying agent (Lewis & Hawley, 1997). There is no evidence from available North American databases (the United States (US) National Library of Medicine Household Products Database) for use of this chemical in consumer products, indicating that it is not likely to be widely available for domestic use.

Rosin metal salts (NICNASb) and manganese soaps (NICNASc) also have relevant reported commercial or site-limited uses:

- as paint and varnish driers;
- as process regulators;
- as colouring agents;
- in the construction industry; and
- in flux, welding and soldering agents.

Restrictions

Australian

No specific Australian restrictions have been identified for the chemical.

The chemical is covered by the entry for Rosin listed in the *Poisons Standard—the Standard for the Uniform Scheduling of Medicines and Poisons* (SUSMP) in Schedule 5 (SUSMP, 2018):

'ROSIN when packaged for use as a soldering flux or in flux-cored solder.'

Schedule 5 chemicals are described as 'Substances with a low potential for causing harm, the extent of which can be reduced through the use of appropriate packaging with simple warnings and safety directions on the label.' Schedule 5 chemicals are labelled with 'Caution' (SUSMP, 2018).

International

No known international restrictions have been identified for the chemical.

Existing Work Health and Safety Controls

Hazard Classification

The chemical is not listed on the Hazardous Chemical Information System (HCIS) (Safe Work Australia).

Exposure Standards

Australian

The following exposure standard is identified for manganese compounds (Safe Work Australia) and considered relevant to the chemical:

- manganese, dust and compounds (as Mn) have an exposure standard of 1 mg/m^3 time weighted average (TWA).

International

The following exposure standards are identified for manganese compounds (Galleria Chemica) and considered relevant to the chemical:

- TWA values of 0.02–5 mg/m^3; and
- short-term exposure limit (STEL) values of 0.6–3 mg/m^3 have been identified.

Health Hazard Information

No data are available for the chemical. The toxicity of manganese compounds, including the chemical in this assessment, is considered mainly due to the presence of the manganese component (cation).

In the absence of data for the chemical, health hazard information for manganese soaps has been used in this report to cover exposure to the manganese component of this chemical. Similar to manganese soaps, the chemical is considered to be insoluble in water (Lewis & Hawley, 1997). The toxicity of manganese soaps was determined based on a combination of limited available data specific to one chemical in the group and read-across from soluble manganese compounds. Read-across was justified as insoluble manganese chemicals, like manganese soaps, are expected to be bioaccessible, and bioaccessibility is considered a better measure of in vivo bioavailability than water solubility (NICNASc). Should specific bioaccessibility and/or bioavailability data become available, the extent to which the classification for manganese soaps has been applied to this chemical could be re-examined.

Manganese is a trace dietary nutrient, with an important role in the biological processes of carbohydrate, cholesterol and amino acid metabolism, as well as bone formation (SCOEL, 2011). It is maintained at relatively stable levels in human tissues via regulated intestinal absorption and excretion by hepatobiliary transport (SCOEL, 2011; ATSDR, 2012). Manganese can be absorbed following inhalation and oral exposure, but it does not readily penetrate the skin following dermal exposure (EPA, 2004). However, the chemical being assessed is in an inorganic transition metal carboxylate complex, and is considered to be more lipophilic than other manganese salts. Therefore, dermal absorption can not be ruled out for the chemical, although its high molecular weight will limit the extent of dermal absorption.

Manganese soaps were recommended for classification for acute oral toxicity, eye irritation, and neurotoxicity following repeated oral and inhalation exposure. These data are considered relevant for the chemical, warranting hazard classification (see **Recommendation** section).

The Tier II human health assessment report for 'Manganese soaps' is available at: https://www.nicnas.gov.au/chemical-information/imap-assessments/imap-group-assessment-report?assessment_id=13338 and should be read in conjunction with this assessment.

The chemical is related to another previously assessed group of chemicals, 'Rosin, hydrogenated rosin and salts' (NICNASb). These chemicals, if oxidised during storage, are sensitising to the skin. Equivocal evidence suggests that inhalation of vapours generated on heating during soldering may cause respiratory sensitisation. Products containing rosin acid and resin acid salts formulated as dusts may also have nuisance dust related respiratory effects. The chemical is expected to have similar properties in terms of sensitisation, warranting hazard classification (see **Recommendation** section). However, the critical toxic effects are expected to be driven predominantly by the manganese component.

The Tier II human health assessment report for 'Rosin, hydrogenated rosin and salts' is available at: https://www.nicnas.gov.au/chemical-information/imap-assessments/imap-group-assessment-report?assessment_id=872 and should be read in conjunction with this assessment.

Risk Characterisation

Critical Health Effects

The critical health effects for risk characterisation are the systemic long-term toxic effects following repeated inhalation and oral exposure. The chemical has potential to cause skin sensitisation, following oxidation of the chemical if subject to prolonged storage; and can also cause harmful systemic effects following a single oral exposure and eye irritation.

Public Risk Characterisation

The chemical is potentially used in paints, but at low concentrations (see **Import, Manufacture and Use Australia** section). The main route of public exposure is expected to be through the skin and inhalation. Only limited absorption of manganese is expected due to the low concentration. Hence, the risk from exposure is not considered unreasonable.

Occupational Risk Characterisation

During product formulation, dermal, ocular and inhalation exposure might occur, particularly where manual or open processes are used. These could include transfer and blending activities, quality control analysis, and cleaning and maintaining equipment. Worker exposure to the chemical at lower concentrations could also occur while using formulated products containing the chemical. The level and route of exposure will vary depending on the method of application and work practices employed.

Given the critical systemic long-term health effects and local effects, the chemical could pose an unreasonable risk to workers unless adequate control measures to minimise 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 HCIS (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.

Regulatory Control

Public Health

The chemical falls within the scope of the listing of ‘Rosin’ in Schedule 5 of the SUSMP, when packaged for use as soldering flux or in flux-cored solder (SUSMP, 2018).

Work Health and Safety

A PCBU 'that carries out welding activities must eliminate risks arising from welding, or if that is not reasonably practicable, minimise the risks so far as is reasonably practicable' by complying with the code of practice for welding processes (Safe Work Australia, 2016).

The chemical is recommended for classification and labelling aligned with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as below. This does not consider classification of physical hazards and environmental hazards.

From 1 January 2017, under the model Work Health and Safety Regulations, chemicals are no longer to be classified under the Approved Criteria for Classifying Hazardous Substances system.

In the absence of specific data on the chemical, data have been read-across from the NICNAS assessments of manganese soaps (NICNASc) and rosin metal salts (NICNASb). Should empirical data become available for the chemical indicating that a lower (or higher) classification is appropriate, this may be used to amend the default classification.

Hazard	Approved Criteria (HSIS)[a]	GHS Classification (HCIS)[b]
Acute Toxicity	Not Applicable	Harmful if swallowed - Cat. 4 (H302)
Irritation / Corrosivity	Not Applicable	Causes serious eye irritation - Cat. 2A (H319)
Sensitisation	Not Applicable	May cause an allergic skin reaction - Cat. 1 (H317)
Repeat Dose Toxicity	Not Applicable	Causes damage to nervous system through prolonged or repeated exposure through inhalation and oral routes - Cat. 1 (H372)

[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 consumers

Products containing the chemical should be used according to the instructions on the label.

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, 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 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.

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