Oxirane, mono[(C12-14-alkyloxy)methyl] derivatives: Human health tier II assessment

01 July 2016

CAS Number: 68609-97-2

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	(C12-14) alkylglycidyl ether alkyl (C12-C14) glycidyl ether
Structural Formula	**No Structural Diagram Available**
Molecular Formula	Unspecified
SMILES	C1(COCCCCCCCCCCCCC)CO1

Import, Manufacture and Use

Australian

The chemical has reported use in adhesives at import volumes of <100 tonnes.

The chemical has reported commercial use as a component in coatings intended to be immersed in water with a typical loading concentration between 5 and 10 %.

International

The following international uses have been identified through:

- the European Union (EU) Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) dossiers;
- Galleria Chemica;
- the United States (US) High Production Volume (HPV) Challenge Program;
- the US Environmental Protection Agency's (EPA) Aggregated Computer Toxicology Resource (ACToR);
- the US EPA Chemical and Product Categories (CPCat) database;
- the US Household Products Database; and
- the Handbook of Fillers, Extenders, and Diluents (Ash & Ash, 2007).

The chemical has reported domestic use as a component of epoxy primers, modifiers, adhesives and resins.

The chemical has reported site-limited uses, including as a reactive diluent and a viscosity reducing modifier for epoxy resins such as bisphenol A-based epoxy resins.

The chemical was listed and recommended for evaluation under the EU Community Rolling Action Plan (CoRAP) 2015–2017 (EU CoRAP, 2015).

Restrictions

Australian

The chemical is listed in the Poisons Standard—*the Standard for the Uniform Scheduling of Medicines and Poisons* (SUSMP)—in Schedule 5 (SUSMP, 2015) under 'Epoxy resins, liquid'.

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, 2015).

International

No international restrictions are available for the chemical.

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):

- Xi; R38 (skin irritation)
- Xi; R43 (sensitisation)

Exposure Standards

Australian

No specific exposure standards are available.

International

No specific exposure standards are available.

Health Hazard Information

There is limited hazard information on the chemical. Where appropriate, the hazards of a similar chemical, alkyl (C_{12}–C_{13}) glycidyl ether (CAS No. 120547-52-6), are considered to be applicable and suitable as a read across in identifying the health hazard of the chemical.

Furthermore, the chemical is included in the list of chemicals for evaluation on the EU Community Rolling Action Plan (CoRAP) 2015–2017 (EU CoRAP, 2015). It is anticipated that this assessment may be re-visited if the outcomes of the EU evaluation are significantly different from this assessment.

Acute Toxicity

Oral

No data are available.

Dermal

In an experiment conducted on New Zealand albino rabbits, topical administration of the chemical at doses ranging from 0.5 to 4.5 mL/kg (equivalent to 4.0 g/kg) did not result in mortalities or any treatment-related effects. Slight to moderate dermal irritation was observed from 72 hours after dermal exposure. A median lethal concentration (LD50) value was not determined in this study (US EPA, 2002).

Inhalation

No data are available.

Corrosion / Irritation

Skin Irritation

The chemical is classified as hazardous with the risk phrase 'Irritating to skin' (Xi; R38) in the HSIS (Safe Work Australia). Although no data are available for this specific endpoint, limited information based on an acute dermal study (see **Acute toxicity - dermal**) and the skin effects of alkyl (C_{12}–C_{13}) glycidyl ether in a repeat dose study reported in this assessment supports the current classification based on dermal irritation observed 72 hours post-exposure to the chemical.

Eye Irritation

No data are available.

Sensitisation

Skin Sensitisation

The chemical is classified as hazardous with the risk phrase ‘May cause sensitisation by skin contact’ (R43) in the HSIS (Safe Work Australia). No data are available for this specific endpoint.

The chemical contains a functional group that presents an alert for skin sensitisation based on their molecular structures as profiled by the OECD Quantitative Structure–Activity Relationship (QSAR) Toolbox v3.2. In the absence of more comprehensive information, a recommendation to amend the current classification is not warranted for this chemical.

Repeated Dose Toxicity

Oral

No data are available for this chemical.

Dermal

No data are available for this chemical. For this specific endpoint, the results for alkyl (C_{12}–C_{13}) glycidyl ether (CAS No. 120547-52-6) are considered to be applicable as a read-across to the chemical and are reported below.

In a 13–week study conducted in Fischer 344 (F344) rats, alkyl (C_{12}–C_{13}) glycidyl ether was topically applied to the skin at doses from 1 to 100 mg/kg bw/d, five days per week. A total of 66 daily doses were applied. No treatment-related systemic effects were observed. Hyperkeratosis and hyperplasia of the epidermis were reported. The no observable adverse effect level (NOAEL) value was determined to be 1 mg/kg bw/d based on local effects but no systemic effects were observed (US EPA, 2002). Based on this study of alkyl (C_{12}–C_{13}) glycidyl ether, the chemical does not meet the criteria to warrant a classification for this particular endpoint.

Inhalation

No data are available for this chemical.

Genotoxicity

No data are available for the chemical. For this specific endpoint, the results for alkyl (C_{12}–C_{13}) glycidyl ether (CAS No. 120547-52-6) are considered to be applicable read across to the chemical and are reported below. Although the limited analogue data do not indicate mutagenic activity, the chemical was recommended for evaluation under the EU Community Rolling Action Plan (CoRAP) 2015–2017 due to a number of concerns including suspicion of mutagenic effects (EU CoRAP, 2015). Therefore, this chemical may be re-assessed for this particular endpoint pending the outcome of the EU evaluation.

In vitro

Alkyl (C_{12}–C_{13}) glycidyl ether gave positive results in a bacterial reverse mutation assay in *Salmonella typhimurium* strains TA1535, with and without metabolic activation. However, negative results were obtained in other *S. typhimurium* strains (TA98, TA100 and TA 1537) and in *Escherichia coli* WP2 uvrA (US EPA, 2002).

Negative results for alkyl (C_{12}–C_{13}) glycidyl ether were also observed in a cytogenetic assay conducted in Chinese hamster ovary (CHO) cells (US EPA, 2002).

In vivo

Alkyl (C_{12}–C_{13}) glycidyl ether gave negative results in a chromosomal aberration assay in ICR mice (US EPA, 2002).

Carcinogenicity

No data are available for the chemical.

Reproductive and Developmental Toxicity

No reproductive and developmental toxicity data are available for the chemical. However, the acute dermal study on the chemical and the repeated dose dermal study on alkyl (C_{12}–C_{13}) glycidyl ether, which is a close analogue to the chemical, did not cause any treatment-related effects on the reproductive organs in any of the tested animals.

In a developmental toxicity study, alkyl (C_{12}–C_{13}) glycidyl ether was dermally applied to pregnant female Sprague Dawley rats at doses from 1 to 200 mg/kg bw for six hours per day from gestation day (GD) 6 to GD 15. There were no treatment related effects on fertility, intrauterine growth, survival, the number of corpora lutea (CL), implantation site, early or late resorptions, or on the number of dead foetuses. The only maternal effect observed were skin effects, which includes fissuring, eschar formation and lack of tone/energy (atonia), occurring at 50 mg/kg bw/d and above. No external malformations on the pups were observed and the systemic maternal and foetal NOAEL values were determined to be 200 mg/kg bw/d in this study (US EPA, 2002).

Based on the information available, reproductive and developmental effects are not expected for the chemical. However, the chemical was recommended for evaluation under the EU Community Rolling Action Plan (CoRAP) 2015–2017 due to a number of concerns including further evaluation of the reproductive toxicity data (EU CoRAP, 2015). Therefore, this chemical may be re-assessed for this particular endpoint pending the outcome of the EU evaluation.

Risk Characterisation

Critical Health Effects

The critical health effects for risk characterisation include local effects (skin sensitisation). The chemical can also cause skin irritation.

Public Risk Characterisation

Given the uses identified for the chemical, the likely public exposure from products containing the chemical are appropriately risk-managed. Although the public could come into contact with articles/coated surfaces containing the chemical, it is expected that the chemical will be bound within the article/coated surface and hence will not be bioavailable. Therefore, the chemical is not considered to pose an unreasonable risk to public health.

Occupational Risk Characterisation

During product formulation, dermal exposure may 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.

NICNAS Recommendation

Current risk management measures are considered adequate to protect public and workers' health and safety, provided that all requirements are met under workplace health and safety, and poisons legislation as adopted by the relevant state or territory.

The chemical was recommended for evaluation under the EU Community Rolling Action Plan (CoRAP) 2015–2017 due to a number of concerns (EU CoRAP). The assessment of this chemical may be re-visited following the NICNAS review of the data from the CoRAP evaluation.

Regulatory Control

Public Health

Products containing the chemical should be labelled in accordance with state and territory legislation (SUSMP, 2015).

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]
Irritation / Corrosivity	Irritating to skin (Xi; R38)*	Causes skin irritation - Cat. 2 (H315)
Sensitisation	May cause sensitisation by skin contact (Xi; R43)*	May cause an allergic skin reaction - Cat. 1 (H317)

[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 dermal 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;
- 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;
- 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

Ash M and Ash I 2007. Handbook of Fillers, Extenders and Diluents, Second Edition. Synapse Information Resource. Accessed on November 2015 at https://books.google.com.au/books?id=C4Cr8dHupVsC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

European Chemicals Agency (ECHA) Community rolling action plan (CoRAP) update covering years 2015, 2016 and 2017. March 17, 2015. http://echa.europa.eu/documents/10162/13628/corap_list_2015-2017_en.pdf

Galleria Chemica. Accessed November 2015 at http://jr.chemwatch.net/galleria/.

Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH). Oxirane, mono[(C12-14-alkyloxy)methyl] derivs (CAS No. 68609-97-2). Accessed November 2015 at http://echa.europa.eu/registration-dossier/-/registered-dossier/15255

Safe Work Australia (SWA). Hazardous Substances Information system (HSIS). Accessed November 2015 at http://hsis.safeworkaustralia.gov.au/HazardousSubstance

The Poisons Standard (the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP)) 2015. Accessed November 2015 at https://www.comlaw.gov.au/Details/F2015L01534

United States (US) Environmental Protection Agency's (EPA) Aggregated Computational Toxicology Resource (ACToR). Accessed November 2015 at http://actor.epa.gov/actor/faces/ACToRHome.jsp

US Environmental Protection Agency's Chemical and Product Categories (CPCat). Accessed November 2015 at http://actor.epa.gov/cpcat/faces/search.xhtml

US EPA (2002). HPV Robust Summaries and Test Plan: Alkyl (C12-C14) Glycidyl Ether. United States Environmental Protection Agency, Washington DC, USA. Accessed November 2015 at http://iaspub.epa.gov/oppthpv/document_api.download?FILE=c13351rt.pdf#_ga=1.251734529.962472069.1378776082

US National Library of Medicines, Household Products Database, Health& Safety Information on Household Products. Accessed November 2015 at http://householdproducts.nlm.nih.gov/

Last update 01 July 2016

Share this page