



**safe work australia**

# Classifying hazardous chemicals

National guide

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JULY 2020

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# Contents

<b>1. Introduction</b> .....	<b>4</b>
1.1 Definitions and abbreviations .....	4
1.2 What are the duties in relation to classification? .....	5
1.3 Transition to GHS 7.....	5
<b>2. The Globally Harmonized System of Classification and Labelling of Chemicals</b> .....	<b>7</b>
<b>3. Classifying hazardous chemicals</b> .....	<b>8</b>
3.1 Classification of substances and mixtures .....	8
3.2 Classification of mixtures.....	10
3.3 Physical hazards .....	11
3.4 Health hazards .....	12
3.5 Acute toxicity .....	12
3.6 Classifying mixtures containing multiple skin or eye corrosives .....	14
3.7 Converting from Approved Criteria or ADG classifications to GHS classifications ..	15
3.8 Classification of articles .....	19
<b>4. Advice on specific situations</b> .....	<b>20</b>
4.1 Fine dusts and nanomaterials .....	20
4.2 Non-GHS hazard information .....	20
4.3 Goods/Products not covered under WHS Regulations .....	21
<b>Appendix A – Where to find chemical information</b> .....	<b>22</b>
<b>Appendix B – Cut off Concentrations for mixtures</b> .....	<b>25</b>
<b>Appendix C – Further examples</b> .....	<b>28</b>
<b>Appendix D – Comparison of Approved Criteria and GHS classifications</b> .....	<b>34</b>
<b>Appendix E – Comparison of ADG Code and GHS classes and categories</b> .....	<b>48</b>
<b>Appendix F – Translation for non-GHS supplemental hazard statements</b> .....	<b>57</b>
<b>Amendments</b> .....	<b>59</b>

# 1. Introduction

This guide is intended for Australian manufacturers and importers of hazardous chemicals, and others who classify substances, mixtures or articles under the Work Health and Safety (WHS) Regulations. It may also be useful for suppliers of hazardous chemicals, persons conducting a business or undertaking (PCBUs), workers and other persons involved with hazardous chemicals.

This document provides information and guidance on:

- Australian manufacturers' and importers' obligations under the WHS Regulations
- the implementation of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) in Australia
- classifying hazardous chemicals in accordance with the GHS, including converting classifications made under the *Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(2004)] 3rd Edition* and the *Australian Code for the Transport of Dangerous Goods by Road & Rail* (the ADG Code), and
- hazards that fall outside the scope of the WHS Regulations, including hazards not classified under the GHS and non-GHS hazard codes.

## 1.1 Definitions and abbreviations

**Table 1** Definitions and abbreviations

Abbreviation	Definition
<b>ADG Code</b>	The Australian Code for the Transport of Dangerous Goods by Road & Rail
<b>Aerosol</b>	Any non-refillable receptacles made of metal, glass or plastic and containing a gas compressed, liquefied or dissolved under pressure, with or without a liquid, paste or powder, and fitted with a release device allowing the contents to be ejected as solid or liquid particles in suspension in a gas, as a foam, paste or powder or in a liquid state or in a gaseous state.
<b>Approved Criteria</b>	The Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(2004)] 3 <sup>rd</sup> Edition.
<b>Article</b>	A manufactured item, other than a fluid or particle, that: <ol style="list-style-type: none"><li>a. is formed into a particular shape or design during manufacture; and</li><li>b. has hazard properties and a function that are wholly or partly dependent on the shape or design.</li></ol>
<b>Dangerous good</b>	A substance, mixture or article that meets the criteria of, or is listed in, the Australian Code for the Transport of Dangerous Goods by Road & Rail.
<b>GHS</b>	The Globally Harmonized System of Classification and Labelling of Chemicals, Seventh revised edition, published by the United Nations as modified under Schedule 6 of the WHS Regulations.
<b>Hazardous chemical</b>	A substance, mixture or article that satisfies the criteria for a hazard class in the GHS.  Note: Certain GHS classifications are exempt from the WHS Regulations. See Chapter 2 for details.

Abbreviation	Definition
<b>LC<sub>50</sub></b>	Lethal Concentration 50%: The concentration (in air or water) of a toxic agent sufficient to kill 50 percent of a population of test animals.
<b>LD<sub>50</sub></b>	Lethal Dose 50%: The dose (when given all at once) of a toxic agent sufficient to kill 50 percent of a population of test animals.
<b>NICNAS</b>	The National Industrial Chemicals Notification and Assessment Scheme.
<b>Person conducting a business or undertaking (PCBU)</b>	The WHS Act places the primary duty of care on the PCBU. The term PCBU is an umbrella concept used to capture all types of working arrangements or structures. A PCBU can be a: company; unincorporated body or association; sole trader or self-employed person. Individuals who are in a partnership that is conducting a business will individually and collectively be a PCBU.  PCBU does not include volunteer associations or elected members of a local authority.
<b>Safety data sheet (SDS)</b>	A document that provides information on the properties of hazardous chemicals and how they affect health and safety in the workplace. Previously known as a material safety data sheet (MSDS).
<b>Substance</b>	Chemical elements and their compounds in their natural state or obtained by any production process, including any additive necessary to preserve the stability of that product and any impurities deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition.
<b>WHS</b>	Work Health and Safety.

## 1.2 What are the duties in relation to classification?

Under the WHS Regulations, a PCBU who manufactures or imports a substance, mixture or article must determine whether the substance, mixture or article is a hazardous chemical. If the substance, mixture or article is a hazardous chemical they must ensure the hazardous chemical is correctly classified as per the GHS.

Duty holders may have other obligations relating to hazardous chemicals, for example manufacturers and importers must disclose chemical identities to medical practitioners in certain cases. See the [model WHS Regulations](#) Chapter 7 Division 2 or the [model Code of Practice: Managing Risks of Hazardous Chemicals in the Workplace](#) for more information.

While suppliers and PCBUs have a number of obligations related to hazardous chemicals, the obligation to classify hazardous chemicals falls entirely to the Australian manufacturer or importer.

## 1.3 Transition to GHS 7

The Globally Harmonized System of Classification and Labelling of Chemicals (GHS) is a global method of classifying chemicals and preparing labels and SDS. The GHS is the basis of the system used for preparing labels and SDS in Australia, and also sets out the criteria used to determine if a chemical is hazardous.

The 3rd revised edition of the GHS (GHS 3) was implemented in Australia on 1 January 2012. On 1 January 2021, Australia will begin a 2-year transition to the 7th revised edition of the GHS (GHS 7). During the transition manufacturers and importers may use either GHS 3 or GHS 7 to prepare classifications, labels and safety data sheets for hazardous chemicals. From 1 January 2023, only GHS 7 may be used.

During the transition, suppliers and users of hazardous chemicals may continue to supply and use chemicals classified and labelled under GHS 3. However, suppliers and users of hazardous chemicals should not supply or receive stock manufactured or imported after 31 December 2022 if it does not have an up to date labels or SDS under GHS 7.

More information about the transition can be found on the Safe Work Australia website.

## 2. The Globally Harmonized System of Classification and Labelling of Chemicals

The GHS is a system of consistent information and terms used to classify and communicate chemical hazards on labels and in SDS. The primary aim of the GHS is to protect human health and the environment. It has been developed through co-operation between the United Nations, the International Labour Office (ILO) and the Organisation for Economic Co-operation and Development (OECD).

A chemical's classification is determined by assessing the chemical's properties against the classification criteria set out in the GHS. The GHS uses signal words ('Danger' and 'Warning'), pictograms, hazard statements and precautionary statements to communicate information. The signal words, pictograms, hazard statements and precautionary statements required on labels and SDS are determined based on the chemical's classification.

Australia has implemented the 7th revised edition of the GHS through the WHS Regulations. A copy of this edition can be downloaded from the [United Nations Economic Commission for Europe website](#).

The following GHS hazard categories are exempt from classification under the WHS Regulations:

- acute toxicity category 5
- skin irritation category 3
- aspiration hazard category 2
- flammable gas category 2
- acute hazard to the aquatic environment category 1, 2 or 3
- chronic hazard to the aquatic environment category 1, 2, 3 or 4
- hazardous to the ozone layer category 1.

If a chemical meets the criteria for one or more of these categories, but does not meet the criteria for any other hazard categories, it is not a hazardous chemical under the WHS Regulations.

Under the [model WHS Regulations](#) the GHS implementation is supported by:

- the [model Code of Practice: Labelling of Workplace Hazardous Chemicals](#), and
- the [model Code of Practice: Preparation of Safety Data Sheets for Hazardous Chemicals](#).

# 3. Classifying hazardous chemicals

The classification process assigns categories to hazardous chemicals based on agreed hazard classification criteria. GHS classification includes:

- physical hazards, for example flammability
- health hazards, for example toxicity and carcinogenicity, and
- environmental hazards, for example hazardous to the aquatic environment.

The GHS provides an internationally standardised method to classify chemicals, allowing manufacturers, importers, suppliers, and users of hazardous chemicals to quickly identify a chemicals hazards.

This guide is based on the GHS as implemented in the model WHS Regulations. As environmental hazards are not captured by the WHS Regulations, classification of these hazards is not discussed in this guide.

## 3.1 Classification of substances and mixtures

Hazard classification in the GHS requires three steps:

1. identify the relevant data for hazards of a substance, mixture or article
2. review the data to determine the hazards associated with the substance, mixture or article, and
3. decide whether the substance, mixture or article will be classified as hazardous and in which classes and categories.

If data already exists that can be applied to the GHS criteria, testing is not required.

This guide contains a number of examples with answers. To complete these examples you will need a copy of the GHS 7<sup>th</sup> revised edition. A free download is available here: [https://www.unece.org/trans/danger/publi/ghs/ghs\\_rev07/07files\\_e.html](https://www.unece.org/trans/danger/publi/ghs/ghs_rev07/07files_e.html).

Another helpful resource is the *Classification and labelling for workplace hazardous chemicals poster*, available here: <https://www.safeworkaustralia.gov.au/doc/classification-and-labelling-workplace-hazardous-chemicals-poster>.

Appendix A contains a list of databases that can be accessed to obtain GHS classifications for hazardous substances. It must be noted that these databases often contain incomplete data or differences in classifications. This is because they may consider different data sources or may not include all hazard classes. For this reason multiple databases should be examined to confirm the classification. Databases are not the only sources of information that can be used to classify hazardous chemicals. Examples of other sources that might be considered are journals, text books, manuals or manufacturers' data.



## Example 1 – classifying a substance using existing information

An importer is classifying isopropyl alcohol (also known as: 2-Propanol, propan-2-ol) [CAS Number 67-63-0]. The overseas supplier is not able to provide a classification, so a decision is made to review the classification information published in authoritative databases. What is the GHS classification of isopropyl alcohol?

### Answer

There are many ways to obtain classification data, including scientific journals, databases and other literature.

One approach to finding information is to use the databases detailed at [Appendix A](#). For this example we have initially reviewed the Australian Department of Health's human health assessment for 2-Propanol. This report is published on the website of the National Industrial Chemical Notification and Assessment Scheme (NICNAS) as described at [Appendix A](#), and can be found by entering the CAS number or chemical name into the search bar at the [National Industrial Chemicals Notification and Assessment Scheme website](#).

The 'Work Health and Safety' section of the *Human Health Tier II assessment for 2-Propanol* includes a GHS classification for human health hazards, but not for physical or environmental hazards. The hazard classes and categories listed for 2-Propanol are:

- specific target organ toxicity, single exposure - category 3, and
- serious eye irritation - category 2A.

As the report only contains information on health hazards, a second source is needed to find more information. In this case we will refer to the classification and labelling inventory published by the [European Chemicals Agency](#) (ECHA). Upon searching the information published by ECHA, we find they have classified isopropyl alcohol as meeting three GHS classes and categories:

- flammable liquid category 2
- specific target organ toxicity, single exposure - category 3, and
- serious eye irritation - category 2.

By considering the information provided by both of these sources we can determine a suitable classification for isopropyl alcohol. Note that in this case we are using 'eye irritation category 2A' as recommended by NICNAS, rather than 'eye irritation category 2' as recommended by ECHA. This is because the NICNAS report includes data to support classification in sub-category 2A while the information published by ECHA does not include data that could lead to sub-categorisation.

Table 2 GHS classification of isopropyl alcohol

GHS classification of isopropyl alcohol	
GHS Classification(s)	Flammable liquid – category 2 Eye irritation – category 2A Specific target organ toxicity, single exposure – category 3
Signal Word	DANGER
Pictogram(s)	 

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## GHS classification of isopropyl alcohol

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<b>Hazard statement(s) (and codes)</b>	H225 (Highly flammable liquid and vapour) H319 (Causes serious eye irritation) H336 (May cause drowsiness or dizziness)
----------------------------------------	-------------------------------------------------------------------------------------------------------------------------------

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As mentioned previously, not all databases are complete, and different databases often contain classifications for different hazard classes. It is up to the manufacturer or importer to determine what classification is appropriate for their chemical in the form it is supplied to the workplace.

## 3.2 Classification of mixtures

You are unlikely to find classification information published about mixtures unless they are very common. As such, if you manufacture or import mixtures you will most likely need to determine their classification through one of the following methods:

1. testing the mixture as a whole, or
2. calculating the properties of the mixture based on the properties and concentrations of its hazardous ingredients.

If you have test data for the mixture this should always take precedence over calculations made based on the mixture's ingredients. This is because:

- calculations are often based on theoretical toxicity values, and may not reflect the ingredients true properties, and
- ingredients may have compounding or inhibiting effects when mixed with each other that can change the classification.

If there is test data for certain hazards but not others, for example test data for acute toxicity but not carcinogenicity, then test data should be used where possible while calculations are used for the other hazards. If you are unable to obtain test data for the mixture you will need to obtain a list of all the ingredients, their concentrations, individual GHS classifications and then determine the classification of the mixture based on its ingredients.

There are various calculation based methods that can be used to classify mixtures. Information about the most common method can be found at [Appendix B – Cut off concentrations for mixtures](#). [Appendix B](#) sets out the cut off concentrations used in Australia, which specify how a mixture's health hazard classifications change based on the concentrations of its ingredients.

While the GHS specifies cut off concentrations for many hazard classes, Australia has implemented its own classification cut off concentrations for mixtures with the following health hazard classes:

- respiratory and skin sensitisers
- carcinogens
- reproductive toxicants
- specific target organ toxicants for single and repeated exposures.

The changes are detailed in Schedule 6 of the WHS Regulations. The table at [Appendix B](#) contains these changes and takes priority over tables in the GHS. It should be applied to hazardous chemicals used, stored or handled within Australia.

**Table 3** An extract of the cut off concentrations table. The full table can be found at Appendix B.

Class	Category	Concentration of hazardous chemical
Specific target organ toxicity (single exposure)	Category 1	Concentration ≥ 10%: category 1
		1% ≤ concentration < 10%: category 2

## Single substance dilution

The table above is an excerpt of the cut off table found at [Appendix B](#). It states that if a substance is classified as ‘Specific target organ toxicity (single exposure) category 1’, diluting that substance to a concentration equal to or above 10% (w/w units for solids and liquids or v/v units for gases) does not change the classification from ‘Specific target organ toxicity (single exposure) category 1’. Diluting the substance further to a concentration between 1% and 10% will reduce the classification to ‘Specific target organ toxicity (single exposure) category 2’. Finally, diluting the substance below 1% results in a mixture that is not classed as hazardous.

If the mixture contains ingredients with physical hazards as opposed to health hazards, it is likely that testing of the mixture will be required. This is explained further in section 3.3 Physical hazards.

## 3.3 Physical hazards

While concentration cut offs allow the classification of a mixture’s health hazards, no such concentration cut offs are available to classify a mixture’s physical hazards. This is because physical hazards are classified on the basis of physical properties such as flash point or boiling point, which are intrinsic to the mixture. As a result, if a mixture potentially has physical hazards it will likely require testing, and this testing must occur on the mixture, not the individual components.

The four physical hazard classes for which the classifications of mixtures can be determined based on the properties of the ingredients are Flammable Gases, Flammable Liquids, Aerosols and Oxidising gases. Detailed advice on classification of physical hazards can be found in the GHS. Organic peroxides can also be classified as non-hazardous based on a formula used to determine their available oxygen content, but if classed as hazardous the classification must be obtained through testing. For other hazard classes testing is required.

### Example 2 – classifying a mixture using test data

In order to classify a flammable liquid, its flash point and initial boiling point are required. These values can be determined by testing, calculated or found in literature.

**Table 4** A copy of table 2.6.1 of the GHS - Criteria for flammable liquids of the GHS

Category	Criteria
1	Flash point < 23°C and initial boiling point ≤ 35°C
2	Flash point < 23°C and initial boiling point > 35°C
3	Flash point ≥ 23°C and ≤ 60°C

Category	Criteria
4	Flash point > 60°C and ≤ 93°C

A manufacturer is classifying a Naphtha/alcohol mixture. It was tested and found to have a flash point and initial boiling point of -10°C and 39°C respectively. What is the classification of the mixture?

### Answer

A flash point below 23°C and a boiling point above 35°C makes this mixture a Flammable liquid – Category 2 (see Table 4).

Information on classifying and testing each physical hazard can be found in their respective chapters of the GHS.

## 3.4 Health hazards

As mentioned previously, health hazards can be classified based on their concentrations within a mixture, and therefore the mixture may not require testing to obtain a classification. With the exception of 'Acute toxicity', 'Skin corrosion/irritation' and 'Eye damage/irritation', each ingredient within a mixture is classified individually. For example, if a mixture contains two Respiratory Sensitisers at 5% w/w each, then the classification is determined on each 5% w/w ingredient, not a single respiratory sensitiser at 10% w/w.

## 3.5 Acute toxicity

Under the GHS, chemicals can be allocated to one of five toxicity categories for each exposure route (oral, dermal or inhalation), the criteria for these categories are set out in Table 3.1.1 of the GHS. Note that the model WHS Regulations only adopt acute toxicity categories 1 to 4.

Acute toxicity values are expressed as (approximate) LD<sub>50</sub> (oral, dermal) or LC<sub>50</sub> (inhalation) values or as acute toxicity estimates (ATE). Further information can be found in the explanatory notes following Table 3.1.1 of the GHS.

When classifying mixtures, a mixture's Acute Toxicity Estimate (ATE<sub>mix</sub>) is determined by combining each hazardous ingredient's ATE using the following formula:

$$\frac{100}{ATE_{mix}} = \sum_n \frac{C_i}{ATE_i}$$

where C<sub>i</sub> = concentration of ingredient i

n = the number of hazardous ingredients

ATE<sub>i</sub> = Acute toxicity estimate of ingredient i

When an LD<sub>50</sub> or LC<sub>50</sub> value is available for an ingredient, this is the value of the ATE for that ingredient. When no LD<sub>50</sub> or LC<sub>50</sub> is available but the ingredient has a documented hazard category, Table 3.1.2 of the GHS is used to convert the hazard category to an acute toxicity point estimate. The acute toxicity point estimates are also available at [Appendix B](#), Table 16.

For acute toxicity calculations, ingredients of a mixture with a concentration <1% (w/w for solids, liquids, dusts, mists and vapours and v/v for gases) are generally not relevant as their impact on the  $ATE_{mix}$  will be extremely low (see GHS 3.1.3.3.a). A hazardous ingredient should still be considered in the classification process if there is a reason to suspect that the ingredient at concentrations <1% still poses a health hazard.

### Example 3 – classifying a mixture containing multiple acutely toxic ingredients

The mixture 'Fakestonia' requires classification. It is an aqueous liquid containing three acutely toxic ingredients. Its hazardous chemical components are detailed in Table 5. Non-hazardous ingredients are not included in the  $ATE_{mix}$  calculation. For this example only acute toxicity (oral) will be calculated, but the process is identical for dermal and inhalation.

**Table 5** Toxicity data for Fakestonia mixture

Ingredient # (i)	Name	State	Concentration	LD <sub>50</sub> oral	Category
1	Ingredient A	Liquid	50.0% w/v	110 mg/kg	Category 3
2	Ingredient B	Liquid	12.0% w/v	Not specified	Category 4
3	Ingredient C	Liquid	4.60% w/v	3.00 mg/kg	Category 1
4	Water	Liquid	33.4% w/v	N/A	N/A

#### Answer

As Ingredient B has no known LD<sub>50</sub> value, Table 16 is used to convert oral category 4 to an acute toxicity point estimate of 500 mg/kg. With these figures, we now have all the information required to use the Acute Toxicity Estimate of a mixture formula above. This mixture contains three hazardous chemicals, so 'n' equals 3.

$$\frac{100}{ATE_{mix}} = \sum_n \frac{C_i}{ATE_i}$$

$$\frac{100}{ATE_{mix}} = \left[ \frac{\text{Compound 1 conc}}{\text{Compound 1 LD}_{50}} \right] + \left[ \frac{\text{Compound 2 conc}}{\text{Compound 2 LD}_{50}} \right] + \dots + \left[ \frac{\text{Compound n conc}}{\text{Compound n LD}_{50}} \right]$$

$$\frac{100}{ATE_{mix}} = \left[ \left[ \frac{50.0}{110} \right] + \left[ \frac{12.0}{500} \right] + \left[ \frac{4.60}{3.00} \right] \right] kg/mg$$

$$\frac{100}{ATE_{mix}} \approx 2.01 kg/mg$$

$$ATE_{mix} \approx \frac{100}{2.01} mg/kg$$

$$ATE_{mix} \approx 49.7 mg/kg$$

$$ATE_{mix} = \text{Acute Toxicity (oral) Category 2}$$

## 3.6 Classifying mixtures containing multiple skin or eye corrosives

When mixing multiple chemicals classified with skin corrosion/irritation or eye damage/eye irritation, the combined percentages of the substances must be examined.

Where reliable data shows that the skin corrosion/irritation effect of an ingredient will not be present in a mixture, the mixture should be classified in accordance with that data. In the example below, we assume that no such data exists.

### Example 4 – classifying a mixture of multiple skin corrosives/irritants

A mixture is made by mixing the two acids as shown in Table 6.

**Table 6** An example mixture's components, categories and concentrations.

Ingredient	Category	Percentage
Ingredient A	Skin Corrosion Category 1	0.95% w/w
Ingredient B	Skin Corrosion Category 2	9.50% w/w
Water	N/A	89.55% w/w

The cut off concentrations for skin corrosives found at [Appendix B](#) are shown below:

**Table 7** Cut offs for skin corrosion.

Class	Category	Concentration of hazardous chemical
Skin corrosion/irritation	Category 1	Concentration $\geq$ 5%: skin corrosion category 1; eye damage category 1 3% $\leq$ concentration < 5%: skin corrosion category 2; eye damage category 1 1% $\leq$ concentration < 3%: skin corrosion category 2; eye damage category 2A
	Category 2	Concentration $\geq$ 10%: category 2

If corrosives were treated like most other health hazards, it would be correct to conclude that 0.95% w/w Category 1 would be downgraded to 'not hazardous', and 9.5% w/w Category 2 would also result in a classification of 'not hazardous', based on cut offs for the class. However, many corrosive chemicals have additive effects which need to be considered.

When classifying a mixture of skin corrosives, Table 3.2.3 or Table 3.2.4 of the GHS should be followed for chemicals with additive effects (e.g. similar acids). They are detailed below:

**Table 8** Table 3.2.3 of the GHS: Concentration of ingredients of a mixture classified as skin corrosive/irritant Category 1, 2 or 3 that would trigger classification of the mixture as hazardous to skin (Category 1, 2 or 3).

Sum of Ingredients classified as:	Concentration triggering classification of a mixture as:		
	Skin corrosive Category 1	Skin irritant Category 2	Skin irritant Category 3
Skin Category 1	≥5%	≥1% but <5%	
Skin Category 2		≥10%	≥1% but <10%
Skin Category 3			≥10%
(10 x Skin Category 1)+ Skin Category 2		≥10%	≥1% but <10%
(10 x Skin Category 1)+ Skin Category 2 + Skin Category 3			≥10%

Note that the classification of corrosive mixtures takes a precautionary approach. If a mixture can be classified as Category 1 using one approach and Category 2 using another approach, it should be classified as Category 1 unless data exists to indicate otherwise.

Based on the information in Table 8, what is the classification of the mixture?

### Answer

The example detailed above is a mixture of Category 1 and Category 2 corrosives so we will use the row 2nd from the bottom of Table 3.2.3 of the GHS shown above.

10 x Skin Category 1 concentration + Skin Category 2 concentration

$$= (10 \times 0.95\%) + 9.5\%$$

$$= 19\%$$

$$= \text{Skin irritant Category 2.}$$

Chemicals with serious eye damage/eye irritation are handled the same way with slightly different cut off limits. The cut off information can be found in Chapter 3.3 of the GHS.

## 3.7 Converting from Approved Criteria or ADG classifications to GHS classifications

In some cases the easiest way to determine a GHS classification is to convert existing classifications under the Approved Criteria or ADG Code to GHS classifications. [Appendices](#)



D and E of this document contain conversion tables for Approved Criteria and ADG classifications respectively. Further examples are at [Appendix C](#).

Note that if you have test data, this should always take precedence over conversions from existing Approved Criteria or ADG classifications.

## Example 5 – translating mixture classifications from Approved Criteria to GHS

A ready-for-bottling insecticide preparation containing a fictional hazardous chemical is being prepared, it requires a classification and SDS in accordance with the WHS Regulations. A single hazardous ingredient is present at 0.4% w/v.

**Table 9** Information available from the product's MSDS

	Description
<b>ADG Classification information</b>	<ul style="list-style-type: none"><li>• Not classified as Dangerous Goods</li><li>• Not classified as a Hazardous Substance</li></ul>
<b>Active ingredient</b>	<ul style="list-style-type: none"><li>• Pyroglusinate 0.4% w/v</li></ul>
<b>Other ingredients</b>	<ul style="list-style-type: none"><li>• Stabilisers 0.5 – 1% w/v (Non-hazardous)</li><li>• Detergents 0.5 – 1% w/v (Non-hazardous)</li><li>• Water: 97.6 – 98.6% w/v (Non-hazardous)</li></ul>
<b>Pyroglusinate</b>	<b>Classification of active ingredient:</b> <ul style="list-style-type: none"><li>• Not classified as Dangerous Goods</li><li>• R60 – May impair fertility</li><li>• R61 – May cause harm to the unborn child</li><li>• R20/21/22 – Harmful by inhalation, in contact with skin or if swallowed</li><li>• R48/20/22 – Harmful. Danger of serious damage to health by prolonged exposure through inhalation and if swallowed.</li><li>• LD<sub>50</sub> – oral = 1620 mg/kg</li><li>• LC<sub>50</sub> – inhalation = 1260 mg/L</li><li>• LD<sub>50</sub> – dermal = 2000 mg/kg</li></ul>

### Answer

While this is a mixture, it only contains a single hazardous chemical. For this reason the mixture's classification can be determined in the same way as the single substance dilution shown earlier. If multiple hazardous ingredients were present in the mixture, classification could only be possible if either:

1. test data for the mixture was available, or
2. the concentrations and hazard classifications of all hazardous ingredients were known.

### Acute Toxicity:

Test data on the hazardous ingredient's toxicity is available. As the concentration of the ingredient is <1% w/w, its acute toxicity is unlikely to be relevant for classification (see section 3.1.3.3 of the GHS). If we calculate an Acute Toxicity Estimate (ATE) we find that the resulting ATE<sub>mix</sub> is calculated as 405,000 mg/kg oral, 315,000 mg/L inhalation and 500,000 mg/kg dermal. These values are far above Category 4 toxicity cut offs of 2,000 mg/kg oral, 20 mg/L inhalation, and 2,000 mg/kg dermal (smaller values are more



hazardous) and therefore the mixture does not have an acute toxicity hazard under the WHS Regulations.

#### Reproductive toxicity:

There is Approved Criteria classification information on reproductive toxicity for the hazardous chemical, but no test data. Classification of the mixture's reproductive toxicity is possible through two options:

1. obtain classifications for each hazardous component from the databases detailed at [Appendix A](#), then apply cut offs based on their concentrations ([Appendix B](#)), or
2. translate Approved Criteria classifications to GHS classifications for each component ([Appendix D/E](#)) and then apply cut offs based on their concentrations ([Appendix B](#)).

Pyroglusinate is not in any database included in [Appendix A](#), so we are limited to option 2.

Table 10 details the Pyroglusinate hazard code conversions from Approved Criteria to GHS. This information is found at Appendix D. R61 is converted to 'H360: Toxic to Reproduction Category 1A' and H360 is category 1 until concentrations fall below 0.3% (see [Appendix B](#)), so a 0.4% w/v solution remains category 1A.

#### Specific target organ toxicity:

Like reproductive toxicity, Approved Criteria classifications are available for the specific target organ toxicity of the hazardous chemical in the mixture, while data is not. The conversions from Approved Criteria to GHS are shown in Table 10.

**Table 10** Hazard code conversions

Approved criteria code	GHS hazard statement	GHS classification
<b>R60</b> – May impair fertility	H360 – May damage fertility or the unborn child	Toxic to Reproduction Category 1A
<b>R61</b> – May cause harm to the unborn child	H360 – May damage fertility or the unborn child	Toxic to Reproduction Category 1A
<b>R20</b> – Harmful by inhalation	H332 – Harmful if inhaled	Acute Toxicity Category 4
<b>R21</b> – Harmful in contact with skin	H312 – Harmful in contact with skin	Acute Toxicity Category 4
	H371 – May cause damage to organs - Single Exposure Category 2	Specific Target Organ Toxicity – Single Exposure Category 2
	H373 – May cause damage to organs through prolonged or repeated exposure	Specific Target Organ Toxicity – Repeated Exposure Category 2
<b>R22</b> – Harmful if swallowed	H373 – May cause damage to organs through prolonged or repeated exposure	Specific Target Organ Toxicity – Repeated Exposure Category 2
	H302 – Harmful if swallowed	Acute Toxicity Category 4
	H371 – May cause damage to organs	Specific Target Organ Toxicity – Single Exposure Category 2

Approved criteria code	GHS hazard statement	GHS classification
R48 – Danger of serious damage to health by prolonged exposure	H373 – May cause damage to organs through prolonged or repeated exposure	Specific Target Organ Toxicity – Repeated Exposure Category 2
	H372 – Causes damage to organs through prolonged or repeated exposure	Specific Target Organ Toxicity – Repeated Exposure Category 1

**Table 11** Resulting hazards after dilution

Hazard statement code	Class – category	Classification of dilution – concentration of hazardous chemical	Resulting classification
H302	Acute Toxicity Category 4	If concentration <1%: not relevant for classification	none
H312	Acute Toxicity Category 4	If concentration <1%: not relevant for classification	none
H332	Acute Toxicity Category 4	If concentration <1%: not relevant for classification	none
H360	Toxic to Reproduction Category 1A	Concentration ≥ 0.3%: category 1	Reproductive toxicity: Category 1A
H371	Specific Target Organ Toxicity – Single Exposure Category 2	Concentration ≥ 10%: category 2	none
H372	Specific Target Organ Toxicity – Repeated Exposure Category 1	Concentration ≥ 10%: category 1 1% ≤ concentration < 10%: category 2	none
H373	Specific Target Organ Toxicity – Repeated Exposure Category 2	Concentration ≥ 10%: category 2	none

Specific target organ toxicity (single exposure) category 2, specific target organ toxicity (repeated exposure) category 1 and specific target organ toxicity (repeated exposure) category 2 fall below their respective cut off concentrations and therefore do not result in classification.

The resulting classification can be seen in Table 12.

**Table 12** GHS Classification

GHS Classifications	
GHS Classification	<ul style="list-style-type: none"> <li>Reproductive toxicity: Category 1A</li> </ul>
Signal Word	<ul style="list-style-type: none"> <li>DANGER</li> </ul>

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## GHS Classifications

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### Pictogram(s)



### Hazard statement(s) (and codes)

- H360 May damage fertility or the unborn child
- 

## 3.8 Classification of articles

Under the WHS Regulations, hazardous chemicals are substances, mixtures and articles that satisfy the criteria for a hazard class in the GHS.

An article is defined in Regulation 5 of the WHS Regulations as:

- 'a manufactured item, other than a fluid or particle, that:
  - a. is formed into a particular shape or design during manufacture; and
  - b. has hazard properties and a function that are wholly or partly dependent on the shape or design.'

Articles are included in the WHS Regulations to ensure that items which have a shape or design that modifies or increases their hazard are appropriately classified.

The two most common examples of articles are explosives, including fireworks, and aerosols. Explosives and aerosols have criteria in the GHS that must be used to classify their intrinsic hazards, and these criteria consider their packaging and design.

In the case of an aerosol, it has a specific hazard property because of its design. If the components that make the aerosol (for example, the metal that makes up the aerosol container and the chemicals that make up the propellant) were not formed into a shape capable of containing a pressurised substance or mixture but instead were mixed together, then the article would behave differently and would have different hazard properties. So the aerosol canister meets both of the criteria for an article detailed above. The GHS contains a chapter on Aerosols, which are defined in Table 1 of this document.

Additionally, the WHS Regulations require that where articles contain a substance or mixture that may be released during the use, handling or storage of the article, the classification of the article must include the correct classification of the substance or mixture that may be released. For example, if an aerosol canister contains a toxic gas that will be released when the aerosol is used it must be classified toxic.

As per Note 2 of section 2.3.2.1 of the GHS, aerosols should not be additionally classified as flammable gases, flammable liquids or flammable solids.

## 4. Advice on specific situations

### 4.1 Fine dusts and nanomaterials

When classifying hazardous chemicals, the classification must reflect the form the product is supplied in. Particle size must be considered in the classification process, as it can affect the physical and/or health hazards of the substance or mixture. For example, a block of quartz (silicon dioxide) would not be classified as causing lung damage, but as a fine powder the silicon dioxide may cause permanent lung damage if inhaled and must be classified accordingly. This is because fine particles are able to be inhaled deep into the lungs where they cause damage, while a block of quartz is not.

Fine particles also have higher surface areas relative to their mass compared to large particles and are therefore often more reactive. This can be seen in a thermite reaction, where powdered metal and metal oxide can react violently, while ingots of the same materials react slowly or not at all.

Particles in the 'nano' scale (one billionth of a metre) may exhibit characteristics unlike similar materials examined at larger scales and must be appropriately classified. For nanoparticles, if the health hazards are not fully characterised, it is recommended that an appropriate SDS be prepared and the container is labelled:

- *Contains engineered/manufactured nanomaterials. Caution: Hazards unknown, or*
- *Contains engineered/manufactured nanomaterials. Caution: Hazards not fully characterised.*

These phrases are to be used on an interim basis only, as the manufacturer or importer has a duty to correctly classify the chemical and include information on known hazards on the label and within the SDS.

### 4.2 Non-GHS hazard information

There are 12 non-GHS hazard statements recognised in Australia. These statements are not mandatory, and do not result in a chemical being considered a hazardous chemical under the WHS Regulations.

However, it is recommended that manufacturers and importers of hazardous chemicals include them on labels and in SDS where applicable to ensure that complete hazard information is provided to chemical users.

The statements are as follows:

#### Physical Hazards

- AUH001: Explosive when dry
- AUH006: Explosive with or without contact with air
- AUH014: Reacts violently with water
- AUH018: In use, may form flammable/explosive vapour-air mixture
- AUH019: May form explosive peroxides
- AUH044: Risk of explosion if heated under confinement

#### Health Hazards

- AUH029: Contact with water liberates toxic gas

- AUH031: Contact with acids liberates toxic gas
- AUH032: Contact with acids liberates very toxic gas
- AUH066: Repeated exposure may cause skin dryness or cracking
- AUH070: Toxic by eye contact
- AUH071: Corrosive to the respiratory tract

On their own, these statements do not require pictograms or signal words to appear on the label.

## 4.3 Goods/Products not covered under WHS Regulations

Infectious agents and chemicals that are only hazardous to the environment are not regulated as hazardous chemicals under the WHS Regulations, and are instead regulated under other laws. Similarly, radioactive materials are not hazardous chemicals under the WHS Regulations unless they also have other hazards that cause them to meet the definition of a hazardous chemical. Designers, manufacturers, importers and suppliers still have general duties under the WHS Act to communicate health and safety hazards of these products.

Some non-chemical products may pose a hazard consistent with criteria within the GHS, but these are not considered hazardous chemicals under the WHS Regulations as they do not meet the definition of a substance, mixture or article. For example, genetically modified bacteria may be grown to break down oil after an oil spill. Even if these bacteria cause skin irritation consistent with criteria in the GHS, they would not be considered a hazardous chemical. Note that in these cases the PCBU still has a duty of care to communicate the hazard associated with the product, which could be done by adding information to labels and product specification sheets.

# Appendix A – Where to find chemical information

Manufacturers and importers can classify hazardous chemicals through the collection, evaluation and review of valid information on the hazards of a chemical. Information may be available:

- from epidemiological data and acknowledged experiences on the effects of chemicals on humans
- from tests that are conducted according to internationally recognised scientific principles published in scientific journal articles
- on labels and within SDS, or
- on databases or lists of chemicals such as Hazardous Chemical Information System (HCIS) (see Table 13 below).

Before using the information from any of the sources listed below, the user needs to be aware of the limitations of the data. For example, the HCIS database does not contain information for all hazard cut offs for all chemicals. Other information sources should also be considered.

**Table 13** Relevant databases for information on hazardous chemical classifications

Name	Maintained by	Contains
<a href="#"><u>HCIS (Hazardous Chemical Information System)</u></a>	Australia	Information on substances that have been classified in accordance with the GHS by an authoritative source, such as the European Chemicals Agency (ECHA) or the National Industrial Chemicals Notification and Assessment Scheme (NICNAS).
<a href="#"><u>National Industrial Chemicals Notification and Assessment Scheme (NICNAS)</u></a>	Australia	Health hazard information for chemicals
<a href="#"><u>European Chemicals Agency 'Information on Chemicals' database</u></a>	EU	Information on chemicals classified in accordance with the GHS for those classes and categories captured by European regulations.
<a href="#"><u>CCID (Chemical Classification and Information Database)</u></a>	New Zealand	Information on chemicals classified in accordance with the GHS under the Hazardous Substances and New Organisms (HSNO) regulations.
<a href="#"><u>CSI (Chemical Sampling Information)</u></a>	United States	Hazard data on a large number of chemical substances that may be encountered in industrial hygiene investigations.

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Name	Maintained by	Contains
<a href="#">eChemPortal</a>	OECD	Information on physical and chemical properties, environmental fate and behaviour, ecotoxicity and toxicity of substances. Classification according to GHS provided when available.
<a href="#">GESTIS – Substance Database</a>	Germany	Information for the safe handling of hazardous chemicals at work (health effects, necessary protective measures, first aid), and on physical and chemical properties.

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**Table 14** Reference information to aid in the classification of chemicals

<b>Name</b>	<b>Maintained by</b>	<b>Contains</b>
<a href="#"><u>Globally Harmonized System of Classification and Labelling of Chemicals (GHS) 7th Edition</u></a>	UN	GHS classification criteria.
<a href="#"><u>UN Model Regulations (transport of dangerous goods)</u></a>	UN	Internationally agreed classification criteria for dangerous goods. Does not contain information for health hazards except acute toxicity categories 1, 2 and 3.
<a href="#"><u>Australian Code for the Transport of Dangerous Goods by Road and Rail 7th edition</u></a>	Australia	Australian classification criteria for dangerous goods. Does not contain information for health hazards except acute toxicity categories 1, 2 and 3.
<a href="#"><u>European Chemicals Agency (ECHA)</u></a>	EU	Information on how to classify.



# Appendix B – Cut off Concentrations for mixtures

Cut off concentrations are used to estimate the health hazards of chemical mixtures. They set out the concentration to which an ingredient needs to be diluted before it is considered non-hazardous or is classified in a lower hazard category. They are easy to use, but should not be relied on for complex mixtures or where other data is available on the mixture.

The concentration limits apply to solids and liquids (w/w units) and gases (v/v units).

**Table 15** Cut off Concentrations for mixtures

Classification of Ingredient		Classification of dilution
Class	Category	Concentration of hazardous chemical
<b>Acute toxicity</b>	All categories	See table 16
<b>Skin corrosion/irritation<sup>#</sup></b>	Category 1	Concentration $\geq$ 5%: skin corrosion category 1; eye damage category 1 3% $\leq$ concentration < 5%: skin corrosion category 2; eye damage category 1 1% $\leq$ concentration < 3%: skin corrosion category 2; eye damage category 2A
	Category 2	Concentration $\geq$ 10%: category 2
<b>Serious eye damage/eye irritation<sup>#</sup></b>	Category 1	Concentration $\geq$ 3%: category 1 1% $\leq$ concentration < 3%: category 2
	Category 2	Concentration $\geq$ 10%: category 2
<b>Sensitisation of the respiratory tract or the skin<sup>*</sup></b>	Respiratory sensitiser category 1	Concentration $\geq$ 1%: category 1, ( $\geq$ 0.2% for gas mixtures)
	Respiratory sensitiser sub-category 1A	Concentration $\geq$ 0.1%: sub-category 1A
	Respiratory sensitiser sub-category 1B	Concentration $\geq$ 1%: sub-category 1B ( $\geq$ 0.2% for gas mixtures)
	Skin sensitiser category 1	Concentration $\geq$ 1%: category 1
	Skin sensitiser sub-category 1A	Concentration $\geq$ 0.1%: sub-category 1A

Classification of Ingredient		Classification of dilution
Class	Category	Concentration of hazardous chemical
	Skin sensitiser sub-category 1B	Concentration $\geq$ 1%: sub-category 1B
<b>Germ cell mutagenicity</b>	Category 1	Concentration $\geq$ 0.1%: category 1
	Category 2	Concentration $\geq$ 1%: category 2
<b>Carcinogenicity*</b>	Category 1	Concentration $\geq$ 0.1%: category 1
	Category 2	Concentration $\geq$ 1%: category 2
<b>Reproductive toxicity*</b>	Category 1	Concentration $\geq$ 0.3%: category 1
	Category 2	Concentration $\geq$ 3%: category 2
	Additional category for effects on or via lactation	Concentration $\geq$ 0.3%: effects on or via lactation
<b>Specific target organ toxicity (single exposure)</b>	Category 1*	Concentration $\geq$ 10%: category 1 1% $\leq$ concentration < 10%: category 2
	Category 2*	Concentration $\geq$ 10%: category 2
	Category 3	Concentration $\geq$ 20%: category 3 (see GHS 3.8.3.4.5)
<b>Specific target organ toxicity (repeated exposure)*</b>	Category 1	Concentration $\geq$ 10%: category 1 1% $\leq$ concentration < 10%: category 2
	Category 2	Concentration $\geq$ 10%: category 2
<b>Aspiration hazard</b>	Category 1	$\geq$ 10%, and kinematic viscosity $\leq$ 20.5 mm <sup>2</sup> /s (see GHS 3.10.3.3): category 1

\*Cut off concentrations for these classes and categories are taken from the model WHS Regulations. All other cut offs are taken from the GHS.

#When classifying mixtures containing multiple chemicals classified as 'Skin corrosion/irritation' or 'Serious eye damage/eye irritation', the component's concentrations are combined as per Table 3.2.3 (for 'Skin corrosion/irritation') or Table 3.3.3 (for 'Serious eye damage/eye irritation') of the GHS.

**Table 16** Conversion from acute toxicity hazard categories to acute toxicity point estimates for use in the acute toxicity estimate formula ( $ATE_{mix}$ ). See Table 3.1.2 of the GHS.

<b>Exposure Route</b>	<b>Classification Category</b>	<b>Converted Acute Toxicity Point Estimate</b>
<b>Oral (mg/kg bodyweight)</b>	Category 1	0.5
	Category 2	5
	Category 3	100
	Category 4	500
<b>Dermal (mg/kg bodyweight)</b>	Category 1	5
	Category 2	50
	Category 3	300
	Category 4	1100
<b>Gases (ppmV)</b>	Category 1	10
	Category 2	100
	Category 3	700
	Category 4	4500
<b>Vapours (mg/L)</b>	Category 1	0.05
	Category 2	0.5
	Category 3	3
	Category 4	11
<b>Dust/mist (mg/L)</b>	Category 1	0.005
	Category 2	0.05
	Category 3	0.5
	Category 4	1.5

# Appendix C – Further examples

## Example 6 – ADG to GHS, solid oxidiser

A solid disinfecting chemical agent has been classified previously under the ADG Code and Approved Criteria. Determine its classification under the GHS. Use GHS Annex 3 Section 3 to find the signal words, pictograms, hazard statements and hazard codes.

**Table 17** ADG/Approved Criteria Classification and other relevant data

<b>Transport information:</b>	<b>Div 5.1 PGII</b>
<b>Risk phrases:</b>	R8 – Contact with combustible material may cause fire R22 – Harmful if swallowed R50/53 - Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment
<b>Other information:</b>	LD <sub>50</sub> oral – rat – 1090 mg/kg

### Answer

As with previous examples, the Approved Criteria classifications are provided, so the conversion table at [Appendix D](#) should be checked first.

[Appendix D](#) shows that R8 for a gas is classed as a category 1 oxidising gas, but there is no direct translation for an R8 liquid or solid to the GHS. However, when checking the translation of the ADG classification at [Appendix E](#), it shows that Div 5.1 PGII translates to Oxidising Solids Category 2.


Code R22 can be translated into a GHS acute toxicity (oral) category; however as there is already data for acute toxicity (oral) this should be used instead. GHS chapter 3.1 shows that an LD<sub>50</sub> oral of 1090 mg/kg falls within acute toxicity (oral) category 4.

R50/53 translates to Acute Aquatic Toxicity Category 1 and Chronic Aquatic Toxicity Category 1.

The GHS Annex 3 Section 3 can now be checked to obtain the signal words, pictograms, hazard statements and hazard codes.

Note that hazard statement H400 (Very toxic to aquatic life) is not included as H410 (Very toxic to aquatic life with long lasting effects) is already included.

Table 18 GHS classification

<b>GHS classification</b>	
<b>GHS Classification(s)</b>	<ul style="list-style-type: none"> <li>• Oxidising solids: Category 2</li> <li>• Acute toxicity – Oral: Category 4</li> <li>• Acute aquatic toxicity: Category 1</li> <li>• Chronic aquatic toxicity: Category 1</li> </ul>
<b>Signal Word</b>	<ul style="list-style-type: none"> <li>• DANGER</li> </ul>
<b>Pictogram(s)</b>	
<b>Hazard statement(s) (and codes)</b>	<ul style="list-style-type: none"> <li>• H272 May intensify fire; oxidiser</li> <li>• H302 Harmful if swallowed</li> <li>• H410 Very toxic to aquatic life with long-lasting effects</li> </ul>

## Example 7 – dilution, mixtures: Rust removing preparation

The following data relates to a rust-removing preparation. The material was classified as a hazardous substance under the Approved Criteria but there is no dangerous goods classification. It has two acid components, each present at 9.95%, while its other components are non-hazardous. What is the classification?

Table 19 ADG/Approved Criteria Classification and other relevant data

<b>Information for whole mixture</b>	
<b>Transport information</b>	<ul style="list-style-type: none"> <li>• <b>Not classified as Dangerous Goods</b></li> </ul>
Risk phrases	<ul style="list-style-type: none"> <li>• R36 – Irritating to eyes</li> <li>• R52 – Harmful to aquatic organisms</li> <li>• R53 – May cause long term adverse effects in the aquatic environment</li> </ul>
Ingredient information	<ul style="list-style-type: none"> <li>• Acid component 1 (9.95% w/w)</li> <li>• Acid component 2 (9.95% w/w)</li> <li>• Surfactants – not classified as hazardous (20% w/w)</li> <li>• Water – remainder</li> </ul>
<b>Information for Acid component 1 (9.95% w/w)</b>	
Risk phrases:	<ul style="list-style-type: none"> <li>• R36/38 – Irritating to eyes and skin</li> <li>• R52/53 – Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment</li> </ul>
Other information:	<ul style="list-style-type: none"> <li>• Nothing relevant</li> </ul>

## Information for whole mixture

### Transport information

- Not classified as Dangerous Goods

## Information for Acid component 2 (9.95% w/w)

### Risk phrases:

- R22 – Harmful if swallowed
- R34 – Causes burns
- R37 – Irritating to resp. system
- R41 – Risk of serious damage to eyes

### Other information:

- LD50 oral – rat – 1950 mg/kg

## Answer

The substance is a mixture of multiple ingredients and there is classification data on some of the mixture's hazards, but not all of them. As a result, a complete list of hazardous ingredients and their concentrations must be used to classify this mixture. These are tabulated as Acid component 1 and Acid component 2.

As there is an Approved Criteria classification of the mixture's environmental hazards, this can be converted to GHS directly without analysing each component's concentration and classification. R52/53 are translated to GHS codes:

- H402 - Harmful to aquatic life - Acute Aquatic Toxicity Category 3
- H412 - Harmful to aquatic life with long lasting effects - Chronic Aquatic Toxicity Category 3

There is also an Approved Criteria classification of the mixture's eye irritation hazards. R36 translates to H319 - Causes serious eye irritation, Eye Irritation Category 2A, so at a minimum the mixture will include this classification.

Using the supplied Approved Criteria codes and the conversion table at [Appendix D](#), pure Acid component 1 is classified with GHS codes:

- H315 – Skin Irritation Category 2
- H319 – Eye Irritation Category 2/2A

Pure Acid component 2 is classified with GHS codes

- H302 – Harmful if swallowed Acute Toxicity Category 4
- H314 – Skin Corrosion Category 1B
- H318 – Serious Eye Damage Category 1
- H335 – May cause respiratory irritation Specific Target Organ Toxicity (single exposure) Category 3
- H371 – May cause damage to organs Specific Target Organ Toxicity (single exposure) Category 2 and
- H373 – May cause damage to organs Specific Target Organ Toxicity (repeated exposure) Category 2

Now that the pure ingredients are classified, we apply the cut off concentrations from [Appendix B](#) to determine the resulting hazard classification of the solution.

**Table 20** Acid Component 1: 9.95% w/w

<b>GHS classification</b>	<b>Appendix B cut offs</b>	<b>Resulting classification</b>
<b>Causes skin irritation</b> Skin irritation Category 2	Concentration $\geq$ 10%: category 2	None
<b>Causes serious eye irritation</b> Eye Irritation Category 2A	Concentration $\geq$ 10%: category	None
<b>Harmful to aquatic life</b> Acute Aquatic Toxicity Category 3		H402 – Harmful to aquatic life Acute Aquatic Toxicity Category 3
<b>Harmful to aquatic life with long lasting effects</b> Chronic Aquatic Toxicity Category 3		H412 – Harmful to aquatic life with long lasting effects Chronic Aquatic Toxicity Category 3

**Table 21** Acid Component 2: 9.95% w/w

<b>GHS classification</b>	<b>Appendix B cut offs</b>	<b>Resulting classification</b>
<b>Harmful if swallowed</b> Acute Toxicity Category 4	All categories See section 3.1.3 of the GHS	none
<b>Causes severe skin burns and eye damage</b> Skin Corrosion Sub- category 1B	Concentration $\geq$ 5%: skin corrosion category 1; eye damage category 1  3% $\leq$ concentration < 5%: skin corrosion category 2; eye damage category 1  1% $\leq$ concentration < 3%: skin corrosion category 2; eye damage category 2A	H314 – Causes severe skin burns and eye damage  Skin Corrosion Sub-category 1B
<b>Causes serious eye damage</b> Eye Damage Category 1	Concentration $\geq$ 3%: category 1  1% $\leq$ concentration < 3%: category 2	Eye Damage Category 1
<b>May cause respiratory irritation</b> Specific Target Organ Toxicity Single Exposure Category 3	Concentration $\geq$ 20%: category 3 (see GHS 3.8.3.4.5)	none

GHS classification	Appendix B cut offs	Resulting classification
<b>May cause damage to organs</b> Specific Target Organ Toxicity – Single Exposure Category 2	Concentration ≥ 10%: category 2	none

<b>May cause damage to organs through prolonged or repeated exposure</b> Specific Target Organ Toxicity Repeated Exposure Category 2	Concentration ≥ 10%: category 2	none
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This example mixes multiple corrosives similar to Example 4 above. As Acid Component 2 is 9.95% w/w and is therefore greater than the 5% w/w cut off in Table 3.2.3 of the GHS, the corrosive category of the mixture remains Category 1B.

Acute toxicity estimates (ATE) are derived from LD<sub>50</sub>/LC<sub>50</sub> test results.

Using the ATE formula in section 3.1 of the GHS, it can be calculated that the ATE of the mixture is approximately 19,600 and therefore won't be classified as toxic.


$$100/ATE_{mix} = 9.95/1950$$

$$100/ATE_{mix} = 5.1 \times 10^{-3}$$

$$ATE_{mix} \sim 19600, \text{ therefore will not be classified as toxic.}$$

The resulting classification is shown below:

**Table 22** GHS Classification(s)

<b>GHS Classification(s)</b>	
<b>GHS Classification(s)</b>	<ul style="list-style-type: none"> <li>• Serious Eye Damage Category 1</li> <li>• Skin Corrosion Sub-category 1B</li> <li>• Acute Aquatic Toxicity Category 3</li> <li>• Chronic Aquatic Toxicity Category 3</li> </ul>
<b>Signal Word</b>	<ul style="list-style-type: none"> <li>• DANGER</li> </ul>
<b>Pictogram(s)</b>	
<b>Hazard statement(s) (and codes)</b>	<ul style="list-style-type: none"> <li>• H402 – Harmful to aquatic life</li> <li>• H412 – Harmful to aquatic life with long lasting effects</li> </ul>



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**GHS Classification(s)**

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- H314 – Causes severe skin burns and eye damage
- 

'H318 – Causes serious eye damage' is not required in the hazard statement above because it already includes the more serious 'H314 – Causes severe skin burns and eye damage'.

# Appendix D – Comparison of Approved Criteria and GHS classifications

If a substance has been previously classified under the *Approved Criteria for Classifying Hazardous Substances [NOHSC: 1008 (2004)]*, manufacturers and importers have the option of using translation tables to re-classify the chemical in accordance with the GHS Classification Criteria or perform a full re-classification based on available data. The following table shows the relationships between the classifications under the Approved Criteria and the GHS.

**Table 23** Translation between Approved Criteria classifications and GHS classifications

Classification under the Approved Criteria [NOHSC:1008(2004)]	Physical state	Classification and hazard statements assigned under GHS classification criteria		
		Classification	Hazard statement	Note
<b>E</b> – Danger: Explosive; <b>R2</b> – Risk of explosion by shock, friction, fire or other sources of ignition		No translation possible. Reclassify utilising GHS criteria for Explosives.		
<b>E</b> – Danger: Explosive; <b>R3</b> – Extreme risk of explosion by shock, friction, fire or other sources of ignition		No translation possible. Reclassify utilising GHS Criteria for Explosives.		
<b>O</b> – Danger: Oxidising; <b>R7</b> – May cause fire		Organic Peroxides Type C and D	H242 - Heating may cause a fire	
		Organic Peroxides Type E and F	H242 - Heating may cause a fire	

Classification under the Approved Criteria [NOHSC:1008(2004)]	Physical state	Classification and hazard statements assigned under GHS classification criteria		
		Classification	Hazard statement	Note
<p><b>O</b> – Danger: Oxidising;  <b>R8</b> – Contact with combustible material may cause fire</p>	Gas	Oxidising Gases Category 1	H270 - May cause or intensify fire; Oxidiser	
<p><b>O</b> – Danger: Oxidising;  <b>R8</b> – Contact with combustible material may cause fire</p>	Liquid, solid	No translation possible. Reclassify utilising GHS criteria for Oxidising Liquids or Oxidising Solids.		
<p><b>O</b> – Danger: Oxidising;  <b>R9</b> – Explosive when mixed with combustible material</p>	Liquid	Oxidising Liquids Category 1	H271 - May cause fire or explosion; Strong oxidiser	
<p><b>O</b> – Danger: Oxidising;  <b>R9</b> – Explosive when mixed with combustible material</p>	Solid	Oxidising Solids Category 1	H271 - May cause fire or explosion; Strong oxidiser	
<b>R10</b> – Flammable	Liquid	Flammable liquids category 1: if flashpoint <23°C and initial boiling point ≤ 35°C	H224 – Extremely flammable liquid and vapour	
		Flammable liquids category 2: if flashpoint <23°C and initial boiling point >35°C	H225 – Highly flammable liquid and vapour	
		Flammable liquids category 3: if flashpoint ≥ 23°C	H226 – Flammable liquid and vapour	
<p><b>F</b> – Danger: Highly Flammable;  <b>R11</b> – Highly flammable</p>	Liquid	Flammable liquids category 1: if initial boiling point ≤ 35°C	H224 – Extremely flammable liquid and vapour	
		Flammable liquids category 2: if initial boiling point >35°C	H225 – Highly flammable liquid and vapour	

Classification under the Approved Criteria [NOHSC:1008(2004)]	Physical state	Classification and hazard statements assigned under GHS classification criteria		
		Classification	Hazard statement	Note
<b>F</b> – Danger: Highly Flammable; <b>R11</b> – Highly flammable	Solid	No translation possible. Reclassify utilising GHS criteria for Flammable Solids.		
<b>F+</b> - Danger: Highly Flammable; <b>R12</b> – Extremely flammable	Gas	Flammable Gas Category 2	None	(10)
<b>F+</b> - Danger: Highly Flammable; <b>R12</b> – Extremely flammable	Liquid	Flammable Liquid Category 1	H224 - Extremely flammable liquid and vapour	(8)
<b>F+</b> - Danger: Highly Flammable; <b>R12</b> – Extremely flammable	Liquid	Self-reactive Type C and D	H242 - Heating may cause a fire	(8)
		Self-reactive Type E and F	H242 - Heating may cause a fire	(8)
		Self-reactive Type G	None	(8)
<b>F</b> – Danger: Highly Flammable; <b>R15</b> – Contact with water liberates extremely flammable gases		Substances and Mixtures which, in contact with water, emit Flammable Gases Category 1	H261 - In contact with water releases flammable gases	
<b>F</b> – Danger: Highly Flammable: <b>R17</b> – Spontaneously flammable in air	Liquid	Pyrophoric Liquids Category 1	H250 - Catches fire spontaneously if exposed to air	
<b>F</b> – Danger: Highly Flammable; <b>R17</b> – Spontaneously flammable in air	Solid	Pyrophoric Solids Category 1	H250 - Catches fire spontaneously if exposed to air	

Classification under the Approved Criteria [NOHSC:1008(2004)]	Physical state	Classification and hazard statements assigned under GHS classification criteria		
		Classification	Hazard statement	Note
<b>F</b> – Danger: Highly Flammable; <b>R17</b> – Spontaneously flammable in air	Gas	Flammable gas category 1A Pyrophoric gas	Extremely flammable gas May ignite spontaneously if exposed to air	
<b>Xn</b> – Harmful; <b>R20</b> – Harmful by inhalation	Gas	Acute Toxicity Category 4	H332 - Harmful if inhaled	(1) (2)
<b>Xn</b> – Harmful; <b>R20</b> – Harmful by inhalation	Vapour	Acute Toxicity Category 4	H332 - Harmful if inhaled	
<b>Xn</b> – Harmful; <b>R20</b> – Harmful by inhalation	Dust/mist	Acute Toxicity Category 4	H332- Harmful if inhaled	(1)
<b>Xn</b> – Harmful; <b>R21</b> – Harmful in contact with skin		Acute Toxicity Category 4	H312 - Harmful in contact with skin	(1)
<b>Xn</b> – Harmful; <b>R22</b> – Harmful if swallowed		Acute Toxicity Category 4	H302 - Harmful if swallowed	(1)
<b>T</b> – Toxic; <b>R23</b> – Toxic by inhalation	Gas	Acute Toxicity Category 3	H331 - Toxic if inhaled	(1) (2)
<b>T</b> – Toxic; <b>R23</b> – Toxic by inhalation	Vapour	Acute Toxicity Category 2	H330 - Fatal if inhaled	
<b>T</b> – Toxic; <b>R23</b> – Toxic by inhalation	Dust/mist	Acute Toxicity Category 3	H331 - Toxic if inhaled	(1)

Classification under the Approved Criteria [NOHSC:1008(2004)]	Physical state	Classification and hazard statements assigned under GHS classification criteria		
		Classification	Hazard statement	Note
<b>T</b> – Toxic; <b>R24</b> – Toxic in contact with skin		Acute Toxicity Category 3	H311 - Toxic in contact with skin	(1)
<b>T</b> – Toxic; <b>R25</b> – Toxic if swallowed		Acute Toxicity Category 3	H301 - Toxic if swallowed	(1)
<b>T+ - Very Toxic;</b> <b>R26</b> – Very toxic by inhalation	Gas	Acute Toxicity Category 2	H330 - Fatal if inhaled	(1) (2)
<b>T+ - Very Toxic;</b> <b>R26</b> – Very toxic by inhalation	Vapour	Acute Toxicity Category 1	H330 - Fatal if inhaled	
<b>T+ - Very Toxic;</b> <b>R26</b> – Very toxic by inhalation	Dust/mist	Acute Toxicity Category 2	H330 - Fatal if inhaled	(1)
<b>T+ - Very Toxic;</b> <b>R27</b> – Very toxic in contact with skin		Acute Toxicity Category 1	H310 - Fatal in contact with skin	
<b>T+ - Very Toxic;</b> <b>R28</b> – Very Toxic if swallowed		Acute Toxicity Category 2	H300 - Fatal if swallowed	(1)
<b>R33</b> – Danger of cumulative effects		Translation as per R48 – Danger of serious damage to health by prolonged exposure (by inhalation, contact with skin or swallowed (R20/21/22)) see below.		
<b>C</b> – Corrosive; <b>R34</b> – Causes burns		Skin Corrosion Sub-category 1B or 1C (check toxicology data)	H314 - Causes severe skin burns and eye damage	(3)

Classification under the Approved Criteria [NOHSC:1008(2004)]	Physical state	Classification and hazard statements assigned under GHS classification criteria		
		Classification	Hazard statement	Note
<b>C</b> – Corrosive; <b>R35</b> – Causes severe burns		Skin Corrosion Sub-category 1A	H314 - Causes severe skin burns and eye damage	
<b>Xi</b> – Irritant; <b>R41</b> – Risk of serious damage to eyes		Eye Damage Category 1	H318 - Causes serious eye damage	
<b>Xi</b> – Irritant; <b>R36</b> – Irritating to eyes		Eye Irritation Category 2A	H319 - Causes serious eye irritation	
<b>Xi</b> – Irritant; <b>R37</b> – Irritating to respiratory system		Specific Target Organ Toxicity Category 3 – Single exposure	H335 - May cause respiratory irritation	
<b>Xi</b> – Irritant; <b>R38</b> – Irritating to skin		Skin irritation Category 2	H315 - Causes skin irritation	
<b>T</b> – Toxic; <b>R39</b> – Danger of very serious irreversible effects <b>R23</b> – Toxic by inhalation		Specific Target Organ Toxicity - Single Exposure Category 1	H370 - Causes damage to organs	(4)
<b>T</b> – Toxic; <b>R39</b> – Danger of very serious irreversible effects <b>R24</b> – Toxic in contact with skin		Specific Target Organ Toxicity - Single Exposure Category 1	H370 - Causes damage to organs	(4)

Classification under the Approved Criteria [NOHSC:1008(2004)]	Physical state	Classification and hazard statements assigned under GHS classification criteria		
		Classification	Hazard statement	Note
<b>T</b> – Toxic; <b>R39</b> – Danger of very serious irreversible effects <b>R25</b> – Toxic if swallowed		Specific Target Organ Toxicity - Single Exposure Category 1	H370 - Causes damage to organs	(4)
<b>T+ -</b> Very Toxic; <b>R39</b> – Danger of very serious irreversible effects <b>R26</b> – Very toxic by inhalation		Specific Target Organ Toxicity - Single Exposure Category 1	H370 - Causes damage to organs	(4)
<b>T+ -</b> Very Toxic; <b>R39</b> – Danger of very serious irreversible effects <b>R27</b> – Very toxic in contact with skin		Specific Target Organ Toxicity - Single Exposure Category 1	H370 - Causes damage to organs	(4)
<b>T+ -</b> Very Toxic; <b>R39</b> – Danger of very serious irreversible effects <b>R28</b> – Very toxic if swallowed		Specific Target Organ Toxicity - Single Exposure Category 1	H370 - Causes damage to organs	(4)
<b>Xn</b> – Harmful; <b>R68</b> – Possible risk of irreversible effects <b>R20</b> – Harmful by inhalation		Specific Target Organ Toxicity - Single Exposure Category 2	H371 - May cause damage to organs	(1) (4)



Classification under the Approved Criteria [NOHSC:1008(2004)]	Physical state	Classification and hazard statements assigned under GHS classification criteria		
		Classification	Hazard statement	Note
<b>Xn</b> – Harmful; <b>R68</b> – Possible risk of irreversible effects <b>R21</b> – Harmful in contact with skin		Specific Target Organ Toxicity	H371 - May cause damage to organs	(1)
		- Single Exposure		(4)
		Category 2		
<b>Xn</b> – Harmful; <b>R68</b> – Possible risk of irreversible effects <b>R22</b> – Harmful if swallowed		Specific Target Organ Toxicity	H371 - May cause damage to organs	(1)
		- Single Exposure		(4)
		Category 1		
<b>R42</b> – May cause sensitisation by inhalation		Respiratory Sensitisation Category 1	H334 - May cause allergy or asthma symptoms or breathing difficulties if inhaled	
<b>R43</b> – May cause sensitisation by skin contact		Skin Sensitisation Category 1	H317 - May cause an allergic skin reaction	
<b>Xn</b> – Harmful; <b>R48</b> – Danger of serious damage to health by prolonged exposure <b>R20</b> – Harmful by inhalation		Specific Target Organ Toxicity	H373 - May cause damage to organs through prolonged or repeated exposure	(1)
		- Repeated Exposure		(4)
		Category 2		
<b>Xn</b> – Harmful; <b>R48</b> – Danger of serious damage to health by prolonged exposure <b>R21</b> – Harmful in contact with skin		Specific Target Organ Toxicity	H373 - May cause damage to organs through prolonged or repeated exposure	(1)
		- Repeated Exposure		(4)
		Category 2		

Classification under the Approved Criteria [NOHSC:1008(2004)]	Physical state	Classification and hazard statements assigned under GHS classification criteria		
		Classification	Hazard statement	Note
<p><b>Xn</b> – Harmful;</p> <p><b>R48</b> – Danger of serious damage to health by prolonged exposure</p> <p><b>R22</b> – Harmful if swallowed</p>		<p>Specific Target Organ Toxicity</p> <p>- Repeated Exposure</p> <p>Category 2</p>	<p>H373 - May cause damage to organs through prolonged or repeated exposure</p>	<p>(1)</p> <p>(4)</p>
<p><b>T</b> – Toxic;</p> <p><b>R48</b> – Danger of serious damage to health by prolonged exposure</p> <p><b>R23</b> – Toxic by inhalation</p>		<p>Specific Target Organ Toxicity</p> <p>- Repeated Exposure</p> <p>Category 1</p>	<p>H372 - Causes damage to organs through prolonged or repeated exposure</p>	<p>(4)</p>
<p><b>T</b> – Toxic;</p> <p><b>R48</b> – Danger of serious damage to health by prolonged exposure</p> <p><b>R24</b> – Toxic in contact with skin</p>		<p>Specific Target Organ Toxicity</p> <p>- Repeated Exposure</p> <p>Category 1</p>	<p>H372 - Causes damage to organs through prolonged or repeated exposure</p>	<p>(4)</p>
<p><b>T</b> – Toxic;</p> <p><b>R48</b> – Danger of serious damage to health by prolonged exposure</p> <p><b>R25</b> – Toxic if swallowed</p>		<p>Specific Target Organ Toxicity</p> <p>- Repeated Exposure</p> <p>Category 1</p>	<p>H372 - Causes damage to organs through prolonged or repeated exposure</p>	<p>(4)</p>
<p><b>R64</b> – May cause harm to breastfed babies</p>		<p>Effects on or via lactation</p>	<p>H362 - May cause harm to breast-fed children</p>	
<p><b>Xn</b> – Harmful;</p> <p><b>R65</b> – Harmful: May cause lung damage if swallowed</p>		<p>Aspiration hazard</p> <p>Category 1</p>	<p>H304 - May be fatal if swallowed and enters airways</p>	

Classification under the Approved Criteria [NOHSC:1008(2004)]	Physical state	Classification and hazard statements assigned under GHS classification criteria		
		Classification	Hazard statement	Note
<b>R67</b> – Vapours may cause drowsiness and dizziness		Specific Target Organ Toxicity - Single Exposure Category 3	H336 - May cause drowsiness and dizziness	
<b>Carcinogen Category 1</b> <b>T</b> – Toxic; <b>R45</b> – May cause cancer		Carcinogenicity Category 1A	H350 - May cause cancer	(5)
<b>Carcinogen Category 2</b> <b>T</b> – Toxic; <b>R45</b> – May cause cancer		Carcinogenicity Category 1B	H350 - May cause cancer	(5)
<b>Carcinogen Category 1</b> <b>T</b> – Toxic; <b>R49</b> – May cause cancer by inhalation		Carcinogenicity Category 1A	H350i - May cause cancer via inhalation	(5)
<b>Carcinogen Category 2</b> <b>T</b> – Toxic; <b>R49</b> – may cause cancer by inhalation		Carcinogenicity Category 1B	H350i - May cause cancer via inhalation	(5)
<b>Carcinogen Category 3</b> <b>Xn</b> – Harmful; <b>R40</b> – Limited evidence of carcinogenic effect		Carcinogenicity Category 2	H351 - Suspected of causing cancer	

Classification under the Approved Criteria [NOHSC:1008(2004)]	Physical state	Classification and hazard statements assigned under GHS classification criteria		
		Classification	Hazard statement	Note
<b>Mutagen Category 1</b> <b>T</b> – Toxic; <b>R46</b> – May cause heritable genetic damage		Mutagenicity Category 1A	H340 - May cause genetic defects	
<b>Mutagen Category 2</b> <b>T</b> – Toxic; <b>R46</b> – May cause heritable genetic damage		Mutagenicity Category 1B	H340 - May cause genetic defects	
<b>Mutagen Category 3</b> <b>Xn</b> – Harmful; <b>R68</b> – Possible risk of irreversible effects		Mutagenicity Category 2	H341 - Suspected of causing genetic defects	
<b>Reproductive Toxin Category 1</b> <b>T</b> – Toxic; <b>R60</b> – May impair fertility <b>R61</b> – May cause harm to the unborn child		Toxic to Reproduction Category 1A	H360 - May damage fertility or the unborn child	(6)
<b>Reproductive Toxin Category 2</b> <b>T</b> – Toxic; <b>R60</b> – May impair fertility <b>R61</b> – May cause harm to the unborn child		Toxic to Reproduction Category 1B	H360 - May damage fertility or the unborn child	(6)

Classification under the Approved Criteria [NOHSC:1008(2004)]	Physical state	Classification and hazard statements assigned under GHS classification criteria		
		Classification	Hazard statement	Note
<b>Reproductive Toxin Category 3</b> <b>Xn</b> – Harmful; <b>R62</b> – Possible risk of impaired fertility <b>R63</b> – Possible risk of harm to the unborn child		Toxic to Reproduction Category 2	H361 - Suspected of damaging fertility or the unborn child	(6)
<b>N</b> – Dangerous for the Environment; <b>R50</b> – Very toxic to aquatic organisms		Acute Aquatic Toxicity Category 1	H400 - Very toxic to aquatic life	(10)
<b>N</b> – Dangerous for the Environment; <b>R50</b> – Very toxic to aquatic organisms <b>R53</b> – May cause long term adverse effects in the aquatic environment		Acute Aquatic Toxicity Category 1	H400 - Very toxic to aquatic life	(7) (9) (10)
		Chronic Aquatic Toxicity Category 1	H410 - Very toxic to aquatic life with long lasting effects	(7) (9) (10)
<b>N</b> – Dangerous for the Environment; <b>R51</b> – Toxic to aquatic organisms <b>R53</b> – May cause long term adverse effects in the aquatic environment		Acute Aquatic Toxicity Category 2	H401 - Toxic to aquatic life	(7) (9) (10)
		Chronic Aquatic Toxicity Category 2	H411 - Toxic to aquatic life with long lasting effects	(7) (9) (10)
<b>R52</b> – Harmful to aquatic organisms		Acute Aquatic Toxicity Category 3	H402 - Harmful to aquatic life	(10)

Classification under the Approved Criteria [NOHSC:1008(2004)]	Physical state	Classification and hazard statements assigned under GHS classification criteria		
		Classification	Hazard statement	Note
<b>R52</b> – Harmful to aquatic organisms		Acute Aquatic Toxicity	H402 - Harmful to aquatic life	(7)
<b>R53</b> – May cause long term adverse effects in the aquatic environment		Category 3		(9)(10)
		Chronic Aquatic Toxicity Category 3	H412 - Harmful to aquatic life with long lasting effects	(7) (9)(10)
<b>R53</b> – May cause long term adverse effects in the aquatic environment		Chronic Aquatic Toxicity Category 4	H413 - May cause long lasting harmful effects to aquatic life	(10)

**Note 1:** For these hazard categories, GHS translation may result in a hazard class that is excluded from legislation. It is possible to use the minimum classification recommended by the GHS and implemented in Australia, unless data or other information is available.

**Note 2:** For gases with these hazard categories, the Approved Criteria and the GHS Classification Criteria specify LC<sub>50</sub> (50% lethal concentration) values in different units (mg/L and ppmV respectively). Conversion from mg/L to ppmV requires the chemical's molar mass and is therefore chemical specific. Consequently, depending on the molecular weight, some gases classified in Approved Criteria hazard categories may result in a more or less severe classification under the GHS Classification Criteria than that indicated.

**Note 3:** It is recommended to classify as skin corrosion sub-category 1B, even if it is possible that skin corrosion sub-category 1C could be applicable. Going back to original data may not result in a possibility to distinguish between sub-categories 1B or 1C, as the exposure period has normally been up to 4 hours according to test guidelines such as OECD TG 404.

**Note 4:** The route of exposure can be added to the hazard statement in the future as indicated in the current classification if it is conclusively proven that no other routes of exposure cause the hazard.

**Note 5:** The route of exposure can be added to the hazard statement as indicated in the current classification if it is conclusively proven that no other routes of exposure cause the hazard. By indicating only the exposure route of concern, this would 'capture' classification R49 ('May cause cancer by inhalation') as indicated in the Approved Criteria.

**Note 6:** Hazard statements H360 (May damage fertility or the unborn child) and H361 (Suspected of damaging fertility or the unborn child) indicate a general concern for both the reproductive properties related to fertility and developmental effects. According to the hazard statement, only the specific effect can be reported if known.

**Note 7:** The Approved Criteria combines acute with chronic toxicity for some hazard categories (i.e. N51 does not exist as an individual classification). However, the GHS Classification Criteria separates acute and chronic hazard classes.

**Note 8:** F+ - Danger: Highly Flammable; R12 - Extremely flammable (liquids) shall be translated as flammable liquid Category 1 unless it is also determined to be self-reactive under the GHS Classification Criteria, in which case, it translates into self-reactive substances and mixtures Type C to G.

**Note 9:** Additional chronic toxicity data based on NOEC (no observed effect concentration) or equivalent EC<sub>x</sub> (the effective concentration that incurs x% response) values shall be considered during re-classification.

**Note 10:** Non-mandatory classification categories.

# Appendix E – Comparison of ADG Code and GHS classes and categories

Table 24 provides translation of chemicals defined as ‘dangerous goods’ under the ADG Code, to the classification assigned under the GHS. The table includes ecotoxicological hazard classes and hazard categories, which are presented as information only and are not mandatory under WHS Regulations. They may be used to supplement the classification of a substance or a mixture that has been classified on the basis of its health effects and physicochemical properties or to comply with other environmental legislation.

Note that chemicals listed in the ADG Code may be assigned to packing groups within dangerous goods on the basis of risk in transport. This may mean that a direct translation to a GHS hazard class may not be correct.

**Table 24** Translation between ADG classifications and GHS classifications

Classification under the ADG Code	Physical state	Classification and hazard statements assigned under GHS Classification Criteria Classification	Classification and hazard statements assigned under GHS Classification Criteria Hazard statement
Explosives too hazardous for transport		Unstable explosive	H200 – Unstable explosive
Substances too hazardous for transport		Self-reactive Substances and Mixtures: Type A	H240 – Heating may cause an explosion
		Organic Peroxides Type A	H240 – Heating may cause an explosion
Division 1.1 Explosives		Explosives Division 1.1	H201 – Explosive; mass explosion hazard
Division 1.2 Explosives		Explosives Division 1.2	H202 - Explosive; severe projection hazard



<b>Classification under the ADG Code</b>	<b>Physical state</b>	<b>Classification and hazard statements assigned under GHS Classification Criteria Classification</b>	<b>Classification and hazard statements assigned under GHS Classification Criteria Hazard statement</b>
<b>Division 1.3 Explosives</b>		Explosives Division 1.3	H203 – Explosive; fire, blast or projection hazard
<b>Division 1.4 Explosives</b>		Explosives Division 1.4	H204 – Fire or projection hazard
<b>Division 1.5 Explosives</b>		Explosives Division 1.5	H205 – May mass explode in fire
<b>Division 1.6 Explosives</b>		Explosives Division 1.6	None
<b>Class 2 Gases</b>	Gas	Gases under pressure	H280 – Contains gas under pressure; may explode if heated
		Gases under pressure – Compressed Gas	
		Gases under pressure – Liquefied Gas	
		Gases under pressure – Dissolved Gas	H281 – Contains refrigerated gas; may cause cryogenic burns or injury
		Gas under pressure – Refrigerated Liquefied Gas	
<b>Division 2.1 Flammable Gases</b>	Gas	Flammable Gases Category 1A	H220 – Extremely flammable gas
	Gas	Flammable Gases Category 1B	H221 – Flammable gas
	Gas	Flammable Gas Category 1A, Pyrophoric Gas	H220 – Extremely flammable gas H232 – May ignite spontaneously if exposed to air

<b>Classification under the ADG Code</b>	<b>Physical state</b>	<b>Classification and hazard statements assigned under GHS Classification Criteria Classification</b>	<b>Classification and hazard statements assigned under GHS Classification Criteria Hazard statement</b>
	Gas	Flammable Gas Category 1A, Chemically unstable gas A	H220 – Extremely flammable gas H230 – May react explosively even in the absence of air
	Gas	Flammable Gas Category 1A, Chemically unstable gas B	H220 – Extremely flammable gas H231 – May react explosively even in the absence of air at elevated pressure and/or temperature
	Aerosol	Aerosols Category 1	H222 – Extremely flammable aerosol H229 – Pressurized container: may burst if heated
	Aerosol	Aerosols Category 2	H223 – Flammable aerosol H229 – Pressurized container: may burst if heated
<b>Division 2.2 Non-flammable, non-toxic Gases</b>	Gas Liquid/Gas	Compressed Gas, Liquefied Gas & Dissolved Gas	H280 – Contains gas under pressure; may explode if heated
	Gas Liquid/Gas	Refrigerated Liquefied Gas	H281 – Contains refrigerated gas; may cause cryogenic burns or injury
	Aerosol	Aerosols Category 3	H229 – Pressurized container: may burst if heated
<b>Division 2.2/Sub-risk. 5.1 Oxidising Gases</b> Non-flammable, non-toxic Gases, Sub-risk Oxidising Substances	Gas	Oxidising Gases Category 1	H270 – May cause or intensify fire; Oxidiser
		Gases under pressure not otherwise specified	H280 – Contains gas under pressure; may explode if heated

<b>Classification under the ADG Code</b>	<b>Physical state</b>	<b>Classification and hazard statements assigned under GHS Classification Criteria Classification</b>	<b>Classification and hazard statements assigned under GHS Classification Criteria Hazard statement</b>
<b>Division 2.3</b> Toxic Gases	Gas	Acute Inhalation Toxicity (gas) Category 1	H330 – Fatal if inhaled
		Acute Inhalation Toxicity (gas) Category 2	H330 – Fatal if inhaled
		Acute Inhalation Toxicity (gas) Category 3	H331 – Toxic if inhaled
		Skin Corrosion Sub-category 1A – 1C	H314 – Causes severe skin burns and eye damage
<b>Class 3: PG I</b> Flammable Liquids	Liquid	Flammable Liquids Category 1	H224 – Extremely flammable liquid and vapour
<b>Class 3: PG II</b> Flammable Liquids	Liquid	Flammable Liquids Category 2	H225 – Highly flammable liquid and vapour
<b>Class 3: PG III</b> Flammable Liquids	Liquid	Flammable Liquids Category 3	H226 – Flammable liquid and vapour
<b>Division 4.1: PG II</b> Flammable Solids	Solid	Flammable Solids Category 1	H228 – Flammable solid
<b>Division 4.1: PG III</b> Flammable Solids	Solid	Flammable Solids Category 2	H228 – Flammable solid
<b>Division 4.1: Self-reactive Substance Type A</b>	Solid	Self-reactive Substances and Mixtures: Type A	H240 – Heating may cause an explosion
<b>Division 4.1: Self-reactive Substance Type B</b>	Solid	Self-reactive Substances and Mixtures: Type B	H241 – Heating may cause a fire or explosion

<b>Classification under the ADG Code</b>	<b>Physical state</b>	<b>Classification and hazard statements assigned under GHS Classification Criteria Classification</b>	<b>Classification and hazard statements assigned under GHS Classification Criteria Hazard statement</b>
<b>Division 4.1: Self-reactive Substance Type C</b>	Solid	Self-reactive Substances and Mixtures: Type C	H242 – Heating may cause a fire
<b>Division 4.1: Self-reactive Substance Type D</b>	Solid	Self-reactive Substances and Mixtures: Type D	H242 – Heating may cause a fire
<b>Division 4.1: Self-reactive Substance Type E</b>	Solid	Self-reactive Substances and Mixtures: Type E	H242 – Heating may cause a fire
<b>Division 4.1: Self-reactive Substance Type F</b>	Solid	Self-reactive Substances and Mixtures: Type F	H242 – Heating may cause a fire
<b>Division 4.1: Self-reactive Substance Type G</b>	Solid	Self-reactive Substances and Mixtures: Type G	None
<b>Division 4.2: PG I</b> Pyrophoric Substances	Liquid	Pyrophoric Liquids Category 1	H250 – Catches fire spontaneously if exposed to air
<b>Division 4.2: PG I</b> Pyrophoric Substances	Solid	Pyrophoric Solids Category 1	H250 - Catches fire spontaneously if exposed to air
<b>Division 4.2: PG II</b> Self-heating Substances		Self-heating Substances and Mixtures Category 1	H251 – Self-heating; may catch fire
<b>Division 4.2: PG III</b> Self-heating Substances		Self-heating Substances and Mixtures Category 2	H252 – Self-heating in large quantities; may catch fire
<b>Division 4.3: PG I</b> Substances which in contact with water emit flammable gases		Substances which, in contact with water, emit flammable gases Category 1	H260 – In contact with water releases flammable gases which may ignite spontaneously

<b>Classification under the ADG Code</b>	<b>Physical state</b>	<b>Classification and hazard statements assigned under GHS Classification Criteria Classification</b>	<b>Classification and hazard statements assigned under GHS Classification Criteria Hazard statement</b>
<b>Division 4.3: PG II</b> Substances which in contact with water emit flammable gases		Substances which, in contact with water, emit flammable gases Category 2	H261 – In contact with water releases flammable gas
<b>Division 4.3: PG III</b> Substances which in contact with water emit flammable gases		Substances which, in contact with water, emit flammable gases Category 3	H261 – In contact with water releases flammable gas
<b>Division 5.1: PG I</b> Oxidising Substances	Liquid	Oxidising Liquids Category 1	H271 – May cause fire or explosion; strong oxidiser
	Solid	Oxidising Solids Category 1	H271 – May cause fire or explosion; strong oxidiser
<b>Division 5.1: PG II</b> Oxidising Substances	Liquid	Oxidising Liquids Category 2	H272 – May intensify fire; oxidiser
	Solid	Oxidising Solids Category 2	H272 – May intensify fire; oxidiser
<b>Division 5.1: PG III</b> Oxidising Substances	Liquid	Oxidising Liquids Category 3	H272 – May intensify fire; oxidiser
	Solid	Oxidising Solids Category 3	H272 – May intensify fire; oxidiser
<b>Division 5.2: Type A</b> Organic Peroxides		Organic Peroxides Type A	H240 – Heating may cause an explosion

<b>Classification under the ADG Code</b>	<b>Physical state</b>	<b>Classification and hazard statements assigned under GHS Classification Criteria Classification</b>	<b>Classification and hazard statements assigned under GHS Classification Criteria Hazard statement</b>
<b>Division 5.2: Type B</b> Organic Peroxides		Organic Peroxides Type B	H241 – Heating may cause a fire or explosion
<b>Division 5.2: Type C</b> Organic Peroxides		Organic Peroxides Type C	H242 – Heating may cause a fire
<b>Division 5.2: Type D</b> Organic Peroxides		Organic Peroxides Type D	H242 – Heating may cause a fire
<b>Division 5.2: Type E</b> Organic Peroxides		Organic Peroxides Type E	H242 – Heating may cause a fire
<b>Division 5.2: Type F</b> Organic Peroxides		Organic Peroxides Type F	H242 – Heating may cause a fire
<b>Division 5.2: Type G</b> Organic Peroxides		Organic peroxides Type G	None
<b>Division 6.1: PG I</b> Toxic Substances		Acute Oral Toxicity Category 1	H300 – Fatal if swallowed
		Acute Dermal Toxicity Category 1	H310 – Fatal in contact with skin
	Dust/mist/ vapour	Acute Inhalation Toxicity Category 1	H330 – Fatal if inhaled

<b>Classification under the ADG Code</b>	<b>Physical state</b>	<b>Classification and hazard statements assigned under GHS Classification Criteria Classification</b>	<b>Classification and hazard statements assigned under GHS Classification Criteria Hazard statement</b>
<b>Division 6.1: PG II</b> Toxic Substances		Acute Oral Toxicity Category 2	H300 – Fatal if swallowed
		Acute Dermal Toxicity Category 2	H310 – Fatal in contact with skin
	Dust/mist/ vapour	Acute Inhalation Toxicity Category 2	H330 – Fatal if inhaled
<b>Division 6.1: PG III</b> Toxic Substances		Acute Oral Toxicity Category 3	H301 – Toxic if swallowed
		Acute Dermal Toxicity Category 3	H311 – Toxic in contact with skin
	Dust/mist/ vapour	Acute Inhalation Toxicity Category 3	H331 – Toxic if inhaled
<b>Division 6.2: Infectious Substances</b>			Not covered by GHS Classification Criteria
<b>Class 7: Radioactive Material</b>			Not covered by GHS Classification Criteria
<b>Class 8: PG I</b> Corrosive Substances		Skin Corrosion Sub-category 1A	H314 – Causes severe skin burns and eye damage
<b>Class 8: PG II</b> Corrosive Substances		Skin Corrosion Sub-category 1B	H314 – Causes severe skin burns and eye damage
<b>Class 8: PG III</b> Corrosive Substances		Skin Corrosion Sub-category 1C	H314 – Causes severe burns and eye damage

Classification under the ADG Code	Physical state	Classification and hazard statements assigned under GHS Classification Criteria Classification	Classification and hazard statements assigned under GHS Classification Criteria Hazard statement
		Corrosive to Metals Category 1	H290 – May be corrosive to metals
<b>Class 9: Acute Aquatic Toxicity I</b>		Acute Aquatic Toxicity Category 1	H400 – Very toxic to aquatic life
<b>Class 9: Chronic Aquatic Toxicity I</b>		Chronic Aquatic Toxicity Category 1	H410 – Very toxic to aquatic life with long lasting effects
<b>Class 9: Chronic Aquatic Toxicity II</b>		Chronic Aquatic Toxicity Category 2	H411 – Toxic to aquatic life with long lasting effects



# Appendix F – Translation for non-GHS supplemental hazard statements

Table 25 provides translation between the Approved Criteria Risk Phrase and additional (non-GHS) hazard statements implemented in Australia. These additional hazard statements should be assigned in accordance with the classification criteria column of Table 25.

**Table 25** Translation between Approved Criteria statements and additional non-GHS hazard statements

Approved Criteria Risk Phrase	Non-GHS Hazard Statement	Classification Criteria
<b>R1</b> – Explosive when dry	AUH001 – Explosive when dry	For explosive substances and mixtures placed on the market wetted with water or alcohols or diluted with other chemicals to suppress their explosive properties.
<b>R6</b> – Explosive with or without contact with air	AUH006 – Explosive with or without contact with air	For substances and mixtures which are unstable at ambient temperatures, such as acetylene.
<b>R14</b> – Reacts violently with water	AUH014 – Reacts violently with water	For substances and mixtures which react violently with water, such as acetyl chloride, alkali metals, titanium tetrachloride.
<b>R18</b> – In use, may form flammable/explosive vapour/air mixture	AUH018 – In use, may form flammable/explosive vapour/air mixture	For substances and mixtures not classified as flammable themselves, but which may form flammable/explosive vapour-air mixtures. For substances this might be the case for halogenated hydrocarbons; and for mixtures this might be the case due to a volatile flammable component or due to the loss of a volatile non-flammable component.
<b>R19</b> – May form explosive peroxides	AUH019 – May form explosive peroxides	For substances and mixtures which may form explosive peroxides during storage, such as diethyl ether, 1,4-dioxan.
<b>R29</b> – Contact with water liberates toxic gas	AUH029 – Contact with water liberates toxic gas	For substances and mixtures which in contact with water or damp air, evolve gases classified for acute toxicity in category 1, 2 or 3 in potentially dangerous amounts, such as aluminium phosphide, phosphorus pentasulphide.
<b>R31</b> – Contact with acid liberates toxic gas	AUH031 – Contact with acid liberates toxic gas	For substances and mixtures which react with acids to evolve gases classified for acute toxicity in category 3 in dangerous amounts, such as sodium hypochlorite, barium polysulphide.

Approved Criteria Risk Phrase	Non-GHS Hazard Statement	Classification Criteria
<b>R32</b> – Contact with acid liberates very toxic gas	AUH032 – Contact with acid liberates very toxic gas	For substances and mixtures which react with acids to evolve gases classified for acute toxicity in category 1 or 2 in dangerous amounts; such as salts of hydrogen cyanide, sodium azide.
<b>R44</b> – Risk of explosion if heated under confinement	AUH044 – Risk of explosion if heated under confinement	For substances and mixtures not classified as, but which may nevertheless display explosive properties in practice if heated under sufficient confinement, in particular substances which decompose explosively if heated in a steel drum do not show this effect if heated in less-strong containers.
<b>R66</b> – Repeated exposure may cause skin dryness and cracking	AUH066 – Repeated exposure may cause skin dryness and cracking	For substances and mixtures which may cause concern as a result of skin dryness, flaking or cracking but which do not meet the criteria for skin irritancy, based on either practical observations or relevant evidence concerning their predicted effects on the skin.

# Amendments

This guide was updated in July 2020 to reflect Australia's transition to GHS 7.