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# **Hazardous Chemicals – The GHS**

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# **Hazardous Chemicals – The GHS**

## **1 Introduction**

In Australia, hazardous substances and dangerous goods have previously been regulated under separate instruments. The [*NSW WHS Regulation 2011*](http://www.legislation.nsw.gov.au/viewtop/inforce/subordleg+674+2011+cd+0+N/?dq=Regulations%20under%20Work%20Health%20and%20Safety%20Act%202011%20No%2010) implements a single framework for hazardous chemicals using a system of chemical classification, labelling and Safety Data Sheet (SDS) requirements based on the [*Globally Harmonised System of Classification and Labelling of Chemicals*](http://www.unece.org/trans/danger/publi/ghs/ghs_rev03/03files_e.html)[[1]](#footnote-1) (GHS). Compliance with the [*GHS*](http://www.unece.org/trans/danger/publi/ghs/ghs_rev03/03files_e.html) is mandatory in NSW from 01 January 2017.

## **2 Definitions**

### 2.1 Hazardous Chemicals

A hazardous chemical is any substance, mixture or article that satisfies the criteria for a hazard class in the GHS (including a classification referred to in Schedule 6 of the WHS Regulations).

These hazards may have an adverse effect on humans and other organisms, or on the environment. The two broad types of hazard classes which may present immediate or long term injury or illness to people and/or damage to property and the environment are:

1. health hazards – may harm human health as a result of exposure, usually though inhalation, skin contact or ingestion
2. physicochemical hazards – pose a risk to humans, property and the environment due to physical or chemical properties (e.g. flammable, corrosive, explosive chemicals).

Many chemicals have both health and physicochemical hazards.

### 2.2 Dangerous Goods

Most substances classified as dangerous goods under the [*ADG Code*](https://infrastructure.gov.au/transport/australia/dangerous/dg_code_7e.aspx) are hazardous chemicals, and so the requirements of the WHS Regulations apply. The following dangerous goods classes are not covered within the scope of workplace hazardous chemical requirements:

1. ADG Class 6.2 Infectious substances
2. ADG Class 7 Radioactive
3. ADG Class 9 Miscellaneous

The requirements for the transport of dangerous goods do not change under the new WHS Regulation. The transportation of dangerous goods is subject to NSW laws based on the requirements of the Australian Code for the Transport of Dangerous Goods by Road and Rail ([*ADG Code*](https://infrastructure.gov.au/transport/australia/dangerous/dg_code_7e.aspx)). ADG Code Class labels will still be used for transport purposes of workplace hazardous chemicals. The [*ADG Code*](https://infrastructure.gov.au/transport/australia/dangerous/dg_code_7e.aspx) recognises the [*GHS*](http://www.unece.org/trans/danger/publi/ghs/ghs_rev03/03files_e.html) as an appropriate labelling system for inner packages of dangerous goods during transport.

ADG Code Class labels have also been retained for the purposes of identifying hazardous chemical storage in workplaces where placards are required.

### 2.3 Globally Harmonised System of Classification and Labelling of Chemicals

The [*Globally Harmonised System of Classification and Labelling of Chemicals*](http://www.unece.org/trans/danger/publi/ghs/ghs_rev03/03files_e.html) (GHS), published by the United Nations, is an internationally agreed system to standardise and harmonise the classification and labelling of chemicals. The [*GHS*](http://www.unece.org/trans/danger/publi/ghs/ghs_rev03/03files_e.html) defines hazard classification criteria and harmonises hazard communication tools such as labelling and safety data sheets.

## **3 The GHS**

### 3.1 GHS Hazard Classification

Hazard classification under the [*GHS*](http://www.unece.org/trans/danger/publi/ghs/ghs_rev03/03files_e.html) involves the identification of the intrinsic hazard(s) of chemicals by assigning a hazard class using defined criteria. Harmonised criteria are provided for the classification of:

1. 16 physical hazards,
2. 10 health hazards, and
3. 2 environmental hazards.

Each hazard class is further divided into hazard categories on the basis of the severity of the hazard within that hazard class (similar to Dangerous Goods packing groups). Tables 2 and 3 in [Appendix 1](#_7_Appendix_1) summarise the hazard classes and corresponding categories for physical and health hazards respectively.

The use of the environmental hazard classes (hazardous to the aquatic environment and hazardous to the ozone layer) is not mandatory in Australia.

### 3.2 GHS Hazard Communication

Hazard communication describes how to convey critical information about the hazards of chemicals and any precautions required to ensure the safe storage, handling and disposal of chemicals. The main tools of hazard communication are labels and Safety Data Sheets (SDS). Hazard information is conveyed using a combination of hazard pictograms, signal words, hazard statements and precautionary statements.

#### Pictograms

There are nine hazard pictograms which represent the physical, health and environmental hazards. Pictograms have a black symbol on a white background surrounded by a red diamond. More than one pictogram can appear on a label or SDS. GHS pictograms may be downloaded from the [United Nations GHS](http://www.unece.org/trans/danger/publi/ghs/pictograms.html) website.

A comparison of hazard classes and categories with ADG code class labels is found in Appendix G of the SafeWork NSW [Labelling of workplace hazardous chemicals code of practice](https://www.workcover.nsw.gov.au/__data/assets/pdf_file/0017/15218/labelling-of-workplace-hazardous-chemicals-code-of-practice-July-2015-3562.pdf).

|  |  |  |
| --- | --- | --- |
| **Explosive** | **Flammable** | **Oxidising** |
| Exploding bomb | Flame | Flame over circle |
| Explosives  Self-reactives  Organic peroxides | Flammables  Self-reactives  Pyrophorics  Self-heating  Organic peroxides  Emits flammable gas | Oxidisers |

|  |  |  |
| --- | --- | --- |
| **Health Hazards** | **Acute toxicity** | **Severe health hazards** |
| Exclamation mark | skull and cross bones | Health hazard |
| Acute toxicity (harmful)  Skin/eye irritation  Skin sensitisation  Specific target organ toxicity (single)  Hazardous to the ozone layer | Acute toxicity (severe) | Carcinogenicity  Respiratory sensitisation  Reproductive toxicity  Specific target organ (single)  Specific target organ (repeated)  Germ cell mutagenicity  Aspiration hazard |

|  |  |  |
| --- | --- | --- |
| **Corrosion** | **Gases under pressure** | **Environmental** |
| Corrosion | Gas cylinder | Environment |
| Corrosive to metals  Skin corrosion  Serious eye damage | Gases under pressure | Aquatic toxicity (acute)  Aquatic toxicity (harmful) |

**Table 1 – GHS Pictograms and Hazard Classes**

#### Signal Words

Two signal words are used to indicate the relative severity of a hazard and provide immediate warning:

1. ‘DANGER’ – used for more severe hazards, and
2. ‘WARNING’ – used for less severe hazards.

Signal words are assigned to each of the GHS hazard categories within the hazard class. Some lower level hazard categories do not use signal words. Only one signal word should be applied to a hazard category.

#### Hazard Statements

Hazards statements (similar to Risk Phrases) are standardised and describe the nature and severity of the hazard. A hazard statement is assigned to each hazard class and category. Each hazard statement is allocated a unique alphanumeric code consisting of one letter and three numbers, as follows:

1. the letter ‘H’ for ‘hazard’ statement
2. a number designating the type of hazard
   * ‘2’ for physical hazards
   * ‘3’ for health hazards
   * ‘4’ for environmental hazards
3. two numbers corresponding to the sequential numbering of hazards arising from the intrinsic properties of the hazardous chemical e.g. explosivity (codes H200 to H210), flammability (codes H220 to H230).

Hazard statements and their codes are listed in [Annex 3 (Section 1)](http://www.unece.org/fileadmin/DAM/trans/danger/publi/ghs/ghs_rev03/English/07e_annex3.pdf) of [*The Globally Harmonised System of Classification and Labelling of Chemicals (GHS)*](http://www.unece.org/trans/danger/publi/ghs/ghs_rev03/03files_e.html).

#### Precautionary Statements

Precautionary statements (similar to Safety Phrases) provide standardised wording to describe recommended measures that should be taken to minimise or prevent adverse effects resulting from exposure to, or improper storage or handling of, a hazardous chemical. There are five categories of precautionary statements:

1. general
2. prevention (precautions to be taken to prevent accident or exposure)
3. response (instructions in case of accidental spillage or exposure, emergency response and first aid)
4. storage (instructions for safe storage)
5. disposal (instructions for appropriate disposal)

Precautionary statements are assigned a unique alphanumeric code which consists of one letter and three numbers, as follows:

1. the letter ‘P’ for ‘precautionary’ statement
2. one number designating the type of precautionary statement as follows:
   * ‘1’ for general precautionary statements
   * ‘2’ for prevention precautionary statements
   * ‘3’ for response precautionary statements
   * ‘4’ for storage precautionary statements
   * ‘5’ for disposal precautionary statements
3. two numbers corresponding to the sequential numbering of precautionary statements.

General precautionary statements (e.g. Keep out of reach of children, read label before use) are not linked to hazard classes or categories and it is not mandatory to include them on labels of workplace hazardous chemicals. Other precautionary statements are assigned to hazard classes and categories.

Precautionary statements and their codes are listed in [Annex 3 (Section 2)](http://www.unece.org/fileadmin/DAM/trans/danger/publi/ghs/ghs_rev03/English/07e_annex3.pdf) of [*The Globally Harmonised System of Classification and Labelling of Chemicals (GHS)*](http://www.unece.org/trans/danger/publi/ghs/ghs_rev03/03files_e.html).

## **4 Getting Ready for the GHS**

### 4.1 Re-labelling

SafeWork NSW has advised that chemical stocks purchased prior to 01 January 2017 which do not comply with the GHS will not be required to be re-labelled, or have their labels amended, provided they comply with current labelling requirements (NOHSC).[[2]](#footnote-2)

### 4.2 Further Recommendations

The following tasks are recommended to prepare workplaces for the introduction of the GHS:

* ensure that chemical labels comply with NOHSC or GHS systems only
* use NOHSC compliant chemicals before GHS compliant chemicals
* request that suppliers provide GHS compliant chemicals only
* minimise stocks through disposal of surplus/unwanted chemicals
* appropriately dispose of chemicals that do not comply with NOHSC or GHS systems
* request GHS compliant labels from supplier if re-labelling is considered necessary (original labels must not be removed or defaced)
* ensure that all SDS comply with the GHS
* review GHS compliant SDS to confirm hazardous properties and identify whether new controls are recommended
* ensure training is up to date

It is imperative that any chemicals which are imported directly from overseas suppliers (rather than through an Australian distributor) are compliant with the GHS. The deliberate import of chemicals which do not comply with the GHS may lead to prosecution by the Regulator.

## **5 Further Information**

The Safe Work Australia [Classification and labelling for workplace hazardous chemical poster](http://www.safeworkaustralia.gov.au/sites/SWA/about/Publications/Documents/679/Classification_and_labelling_workplace_hazardous_chemicals_poster%20-A4.pdf) shows GHS signal words, pictograms and hazard statements for each GHS hazard class and category under the WHS Regulations.

Safe Work Australia [Frequently asked questions GHS](http://www.safeworkaustralia.gov.au/sites/swa/whs-information/hazardous-chemicals/faqs/pages/faqs)

SafeWork Australia/NSW Codes of Practice:

* [Managing risks of hazardous chemicals in the workplace code of practice](http://www.safework.nsw.gov.au/__data/assets/pdf_file/0018/52155/managing-risks-hazardous-chemicals-code-3837.pdf)
* [Labelling of workplace hazardous chemicals code of practice](http://www.safework.nsw.gov.au/__data/assets/pdf_file/0016/50083/Labelling-of-workplace-hazardous-chemicals-code-of-practice-SW08161-0316-313937.pdf)
* [Preparation of safety data sheets for hazardous chemicals code of practice](http://www.safeworkaustralia.gov.au/sites/SWA/about/Publications/Documents/642/Preparation_of_Safety_Data_Sheet_for_Hazardous_Chemicals2.pdf)

SafeWork NSW [Chemicals and the GHS](http://www.safework.nsw.gov.au/health-and-safety/safety-topics-a-z/hazardous-chemical/chemical-labelling)

Safe Work Australia [Hazardous Chemicals including GHS](http://www.safeworkaustralia.gov.au/sites/swa/whs-information/hazardous-chemicals/pages/hazardous-chemicals-other-substances)

Comcare [Introducing the GHS](https://www.comcare.gov.au/preventing/hazards/chemical_hazards/globally_harmonised_system_of_classification_and_labelling_of_chemicals_ghs/ghs_video)

Comcare [GHS](https://www.comcare.gov.au/preventing/hazards/chemical_hazards/globally_harmonised_system_of_classification_and_labelling_of_chemicals_ghs)

Comcare [Are you GHS ready?](http://www.comcare.gov.au/static/lectora/ghs/index.html)

## **6 Document Control**

|  |  |  |  |
| --- | --- | --- | --- |
| **Version** | **Date Released** | **Approved by** | **Amendment** |
| 1 | Sept 2016 | Associate Director, WHS | Original |

## **7 Appendix 1**

**Table 2 - Physical Hazard Classes and Categories**

|  |  |  |
| --- | --- | --- |
| **PHYSICAL HAZARDS** | | |
| **Class** | **Category** | **Statement** |
| Explosives | Unstable explosive | Unstable explosive |
| Division 1.1 | Explosive; mass explosion hazard |
| Division 1.2 | Explosive; severe projection hazard |
| Division 1.3 | Explosive; fire, blast or projection hazard |
| Division 1.4 | Fire or projection hazard |
| Division 1.5 | May mass explode in fire |
| Division 1.6 | No hazard statement |
| Flammable gases | Category 1 | Extremely flammable gas |
| Flammable aerosols | Category 1 | Extremely flammable aerosol |
| Category 2 | Flammable aerosol |
| Oxidising gases | Category 1 | May cause or intensify fire |
| Gases under pressure | Compressed gas | Contains gas under pressure; may explode if heated |
| Liquefied gas |
| Dissolved gas |
| Refrigerated liquefied gas | Contains refrigerated gas; may cause cryogenic burns or injury |
| Flammable liquids | Category 1 | Extremely flammable liquid and vapour |
| Category 2 | Highly flammable liquid and vapour |
| Category 3 | Flammable liquid and vapour |
| Category 4 | Combustible liquid |
| Flammable solids | Category 1 | Flammable solid |
|  | Category 2 |
| Self-reactive substances | Type A | Heating may cause explosion |
| Type B | Heating may cause fire or explosion |
| Type C and D | Heating may cause a fire |
| Type E and F |
| Type G | No hazard statement |
| Pyrophoric liquids | Category 1 | Catches fire spontaneously if exposed to air |
| Pyrophoric solids | Category 1 | Catches fire spontaneously if exposed to air |
| Self-heating substances | Category 1 | Self-heating; may catch fire |
| Category 2 | Self-heating in large quantities; may catch fire |
| Substances which, in contact with water, emit flammable gases | Category 1 | In contact with water releases flammable gases which may ignite spontaneously |
| Category 2 | In contact with water releases flammable gases |
| Category 3 |
| Oxidising liquids | Category 1 | May cause fire or explosion; strong oxidiser |
| Category 2 | May intensify fire; oxidiser |
| Category 3 |
| Oxidising solids | Category 1 | May cause fire or explosion; strong oxidiser |
| Category 2 | May intensify fire; oxidiser |
| Category 3 |
| Organic peroxides | Type A | Heating may cause explosion |
| Type B | Heating may cause fire or explosion |
| Type C and D | Heating may cause a fire |
| Type E and F |
| Type G | No hazard statement |
| Corrosive to metals | Category 1 | May be corrosive to metals |

**Table 3 - Health Hazard Classes and Categories**

|  |  |  |
| --- | --- | --- |
| **HEALTH HAZARDS** | | |
| **Class** | **Category** | **Statement** |
| Acute toxicity | Category 1 | Fatal if swallowed; fatal in contact with skin; fatal if inhaled |
| Category 2 |
| Category 3 | Toxic if swallowed; toxic in contact with skin; toxic if inhaled |
| Category 4 | Harmful if swallowed; harmful in contact with skin; harmful if inhaled |
| Skin corrosion/irritation | Category 1A | Causes severe skin burns and eye damage |
| Category 1B |
| Category 1C |
| Category 2 | Causes skin irritation |
| Serious eye damage/eye irritation | Category 1 | Causes serious eye damage |
| Category 2A | Causes serious eye irritation |
| Respiratory or skin sensitisation | Respiratory Sensitisers Category 1 | May cause allergy or asthma symptoms or breathing difficulties if inhaled |
| Skin Sensitisers Category 1 | May cause an allergic skin reaction |
| Germ cell mutagenicity | Category 1A | May cause genetic defects |
| Category 1B |
| Category 2 | Suspected of causing genetic defects |
| Carcinogenicity | Category 1A | May cause cancer |
| Category 1B |
| Category 2 | Suspected of causing cancer |
| Reproductive toxicology | Category 1A | May damage fertility and/or the unborn child |
| Category 1B |
| Category 2 | Suspected of damaging fertility and/or the unborn child |
| Effects on or via lactation | May cause harm to breast-fed children |
| Specific target organ toxicity – single exposure | Category 1 | Causes damage to organs |
| Category 2 | May cause damage to organs |
| Category 3 | May cause respiratory irritation; may cause drowsiness or dizziness |
| Specific target organ toxicity – repeated exposure | Category 1 | Causes damage to organs through prolonged or repeated exposure |
| Category 2 | May cause damage to organs through prolonged or repeated exposure |
| Aspiration toxicity | Category 1 | May be fatal if swallowed and enters airways |

1. Provisions relating to chemicals under the WHS Regulations refer specifically to the 3rd revised edition of the [GHS](http://www.unece.org/trans/danger/publi/ghs/ghs_rev03/03files_e.html) [↑](#footnote-ref-1)
2. See [National Code of Practice for the Labelling of Workplace Substances](http://www.safeworkaustralia.gov.au/sites/swa/about/publications/pages/cp1994labellingofsubstances) [NOHSC:2012(1994)] [↑](#footnote-ref-2)