Labelling of chemicals according to GHS in Australia*

There are three main questions:

- Who needs to do it?
- What needs to be labelled or re-labelled?
- How do you do it?

Who needs to label chemicals according to GHS?

> **All chemicals in use in laboratories throughout Australia (except VIC and WA) must NOW be labelled according to GHS. WA and VIC likely to follow soon.**

In ACT, NSW, NT, QLD, SA and TAS, the Work Health and Safety (WHS) Act and its Regulation were passed into law in either 2011 or 2012. The Act provided a 5-year period for hazardous chemicals for the transition from Material Safety Data Sheets (MSDSs) to Safety Data Sheets (SDSs) and for the transition from Hazardous Substances labelling to labelling according to the Globally Harmonised System of Classification and Labelling of Chemicals (GHS) [1]. On 31 December 2016, the transition period ended. Only labelling according to GHS is now legally permitted in ACT, NSW, NT, QLD, SA and TAS. The WHS Act is binding on the Crown, so government schools must also comply.

The Work Health and Safety Regulation references “Codes of Practice”, including the “Labelling Workplace Hazardous Chemicals Code of Practice” [2]. This Code is important for schools, since it regulates the way in which small containers of hazardous chemicals used by students must be labelled. This is a particular issue in Science, but also in other subjects such as Art and Tech, and for Maintenance. The Code distinguishes "Decanted or transferred hazardous chemicals" and has both mandatory and recommended instructions for labelling them. Schools in ACT, NSW, NT, QLD, SA and TAS must follow the Code.

In WA, the Work Health and Safety Act and Regulation have been introduced into parliament, put out for public comment and comments have been received. It is expected to soon become law, after minor revisions.

In VIC, the Work Health and Safety Act and Regulation have not yet been introduced into parliament, but the current Hazardous Substances Regulations 2007 will expire on 30 June 2017 and must be replaced. Draft replacement legislation, to commence on 1 July 2017, includes the requirement for SDSs but not mandatory labelling according to GHS. The draft legislation may be modified, however. It is likely that VIC will be obliged to follow every other State and Territory.

* In New Zealand and Canada, labelling of original chemical containers according to GHS is required by law, but the labelling of “decanted or transferred hazardous chemicals” in small containers used in school laboratories is yet to be regulated. Since NZ has been modelling its new safety legislation on that in Australia, it is likely that the labelling requirements will be the same. Readers in NZ and CA can skim-read the first answer about the confusing situation in Australia; most of answer 2 and all of answer 3 are applicable in NZ and CA.

In VIC and WA, the labelling Code is not yet law. Previous systems (based on Hazardous Substances) for the labelling of "Decanted or transferred hazardous chemicals" are still in force. These systems require the old Dangerous Goods diamonds on the label, but do not ban the presence of additional information, e.g. GHS, on the label. Thus, schools in VIC and WA can label small containers of hazardous chemicals used by students according to GHS, as long as they add the appropriate Dangerous Goods diamonds.

What needs to be labelled or re-labelled?

> **Mostly small chemical containers (dropper bottles, small jars, etc) used by students.**
> **Original containers usually ok.**

GHS labelling is required for chemicals that are in use.
Chemicals in storage or in transport, require labelling as Dangerous Goods (with some minor GHS modifications in progress)

It is confusing that there are two different labelling systems in operation.
A box of chemicals will arrive at a school with labelling on the outside of the box according to Dangerous Goods, but the individual bottles will be labelled according to GHS.

Chemicals in use

As soon as a bottle of a chemical is moved from a chemical store to a laboratory, it is brought into use and must be labelled according to GHS.

Chemicals in dropper bottles, small jars, "decanted or transferred hazardous chemicals"

According to the "Labelling of Workplace Hazardous Chemicals Code of Practice" by Safe Work Australia (March 2015) [2], reagent bottles in a school science laboratory would be regarded as "Decanted or transferred hazardous chemicals", meaning that a hazardous chemical has been decanted or transferred from the container in which it was packed and it will not be used immediately or it is supplied to someone else.

For such a chemical, a label is required [2, Section 3.3] which must, at a minimum, be written in English and include the following:
* the product identifier, and
* a hazard pictogram or hazard statement consistent with the correct classification of the chemical.

There is guidance for the orientation and size of label elements in the Code of Practice [2, Section 4.2]. For containers up to 500 mL capacity, the minimum pictogram size is 15 x 15 mm and the minimum text size is 2.5 mm. For containers 500 mL to 5 L capacity, the minimum pictogram size is 20 x 20 mm and the minimum text size is 3 mm. Otherwise, hazard pictograms and text may be in any size and style that is easily legible and is appropriate to the size of the label and container.

RiskAssess labels comply fully with both the mandatory requirements and the recommendations of the Code of Practice for decanted or transferred hazardous chemicals, and some valuable additional information is also provided.

In RiskAssess, we have chosen to
* include the signal word, since it provides a rapid summary of the hazard level
* use pictograms, rather than hazard statements, since they are more readily understood
* add hazard statements, when there is sufficient room
* include the chemical formula, to help student learning
* focus on communicating the most essential information.

The Code of Practice has been adopted in every Australian State and Territory in which the Work Health and Safety Act has been passed into law (all but VIC and WA).

The RiskAssess labels are not a substitute for the original labels on chemical containers provided by the manufacturer or supplier, since the original containers require more extensive labelling.

The information in the label for each pure substance comes from the ECHA database [3], also used by Safe Work Australia in its "Hazardous Chemicals Information List" [4]. The information in the label for each solution comes from the ECHA database [3], if data are available for "Specific Concentration Limits"; otherwise, the data come from the application of the rules in the GHS [1] to the ECHA classification of the pure chemical [3], following the rules for mixtures, with water as an inert diluent [5].

ECHA regularly adds new data on chemical classifications, and updates summary information. The labels in RiskAssess will change over time, based on the updates in the ECHA database. The labels may not agree with those based on older or different data.

Chemicals in original containers

Chemicals in their original containers, with full GHS labelling, require no further labelling. All new bottles of chemicals should arrive at school with full GHS labelling and you should not accept them if this is not so.

Old bottles of chemicals, purchased before 1 January 2017, in their original containers, generally require no further labelling. The exceptions are ancient bottles without Dangerous Goods or Hazardous Substances information. If you have such a bottle and wish to keep it, the bottle should be additionally labelled with full GHS information, following the current labelling of the same chemical from a reputable supplier, and a note should be recorded of the additional labelling.

Older bottles of chemicals should be used first, so that problems with the labels of old bottles disappear as rapidly as possible. In general, schools should dispose of chemicals that are rarely or never used. Much of the problem associated with old bottles of chemicals vanishes with good housekeeping.

Chemicals in storage

Schools store small quantities of chemicals. The chemicals must be stored in separate groups, according to the Class of Dangerous Goods to which they belong. The Dangerous Goods Class may not be shown on the container, but the chemical still needs to be stored according to its Dangerous Goods Class. The Classes of Dangerous Goods place chemicals with similar properties together, e.g. flammable liquids, corrosives, poisons. The idea is that each Class of chemicals can be stored in a manner appropriate to the Class, e.g. flammable liquids in a special "flammable liquids" cabinet.

Legislation generally requires increasingly stringent methods of storage as the quantity of chemicals being stored increases. Small quantities, as in a school, require an up-to-date "register" be kept of all the chemicals stored, and a "risk management" approach is required to the means of storage, in most jurisdictions. Large quantities, as in an industrial storage area, require a "manifest" to be maintained and there are separation distances which must be maintained between Classes of chemicals, plus additional controls for containment, fire fighting, etc.

The small quantities of chemicals stored in schools, typically in a number of stores in locations such as Science, "Tech", "Art", "Maintenance" must be segregated according to Class in each area, and the Class of the chemicals clearly marked.

Old bottles of chemicals do not need to be re-labelled, unless they are so old that they have no Dangerous Goods or Hazardous Substances labelling. The idea is that old bottles of chemicals in storage should be gradually used up and disappear.

Chemicals in transport

Schools are rarely involved in the transport of chemicals. Moving chemicals small distances within a school (e.g. from one laboratory to another) is not regarded as transport, according to the legislation. A school might be involved in transport of chemicals if, for instance, it wished to transfer chemicals from one campus to another on public roads. In this case, packaging according to the transport regulations for Dangerous Goods is required. Fundamentally, this is to ensure that the chemicals do not escape and contaminate the environment, or cause injury to any person.

If you wish to transport chemicals, consult the transport regulations in your State or Territory. The regulations are very similar everywhere, since transport occurs across national borders and Dangerous Goods legislation is almost international. However, you should comply with the exact requirements in your jurisdiction.

How do you do the labelling?

> **Use RiskAssess for small chemical containers (dropper bottles, small jars, etc). Original containers usually ok.**

The labelling software in RiskAssess (https://www.riskassess.com.au for Australia, https://www.riskassess.co.nz for New Zealand and https://www.riskassess.ca for Canada) allows printing of either "standard labels", using data in the chemical database, or "custom labels", using any text for the name and concentration, with any combination of signal word, pictogram(s) and hazard statement(s).

Standard labels

The “standard labels” allow the labelling of containers for all “Decanted or transferred hazardous chemicals” that are either pure substances or aqueous solutions listed in the RiskAssess database (>2300 chemicals and their solutions).
In addition, the standard labels can be used for the most common
* indicator/dye solutions in aqueous alcohol
* saturated solutions, and
* well-defined reagents.

The standard labels are fast and simple to produce. Nearly all the labels you need should be available as standard labels. You can print either on plain paper or on Avery-style label sheets in a range of sizes. Accurate GHS data for solutions are incorporated into the label, since RiskAssess looks up and extracts data for the appropriate concentration range. All you need is an A4, preferably colour, printer.

“Custom labels” allow the labelling of everything else that is classified as a hazardous chemical. You need to work out what should be on the label and then RiskAssess will make it easy for you to create the label.

Custom labels for commercial products, e.g. glue, thinners, oil-based paint

Just look up the SDS and make a note of the
* name
* signal word
* pictograms
* hazard statements
and enter these in the sections of the custom label.

Custom labels for mixtures of pure chemicals, e.g. acidified potassium permanganate

You need to apply the rules of the GHS for mixtures of chemicals [1], but this is relatively easy if you use the information in the chemical database of RiskAssess:

Look up each chemical in the mixture at the appropriate concentration and make a list of
* Signal word
* Pictograms
* Hazard statements
for each chemical component.

There is a set of simple rules for processing the signal words, pictograms and hazard statements.

Signal word
Select the signal word that is the most severe, after eliminating duplicates,
e.g. DANGER rather than WARNING, if both are on the list.
The order is DANGER > WARNING > nothing.
Enter the most severe signal word in the label for the mixture.

Pictograms
Combine all the pictograms, eliminating duplicates.
Eliminate "Harmful" if
* "Toxic" is on the list
* "Corrosive" is on the list and "Harmful" is ONLY present for skin or eye irritation
* "Health hazard" is on the list for respiratory sensitisation and "Harmful" is ONLY present for skin sensitisation, or for skin or eye irritation.
The "Harmful" pictogram is eliminated in these circumstances since a more severe pictogram is present.
Enter all the remaining pictograms in the label for the mixture.

Hazard statements
Combine all the hazard statements, eliminating duplicates.
If "Causes severe skin burns and eye damage" and "Causes serious eye damage" are on the list,
eliminate "Causes serious eye damage" (since it is redundant).
If there are multiple hazard statements relating to the one property, choose the most severe statement, e.g. for respiratory toxicity,
H330: Fatal if inhaled
H331: Toxic if inhaled
H332: Harmful if inhaled
H333: May be harmful if inhaled
Fatal if inhaled > Toxic if inhaled > Harmful if inhaled > May be harmful if inhaled.
Generally, this involves choosing the code with the smallest H-number.
Enter all the remaining hazard statements in the label for the mixture.

Congratulations!
Now you can label any hazardous chemical!

---

[1] United Nations "Globally Harmonized System of Classification and Labelling of Chemicals (GHS)" 6th ed., New York and Geneva, 2015.
http://www.unece.org/trans/danger/publi/ghs/ghs_rev06/06files_e.html

[2] Safe Work Australia "Labelling Workplace Hazardous Chemicals Code of Practice", Sept 2015.
Section 3.3: Transferred or decanted hazardous chemicals
Section 4.2: Orientation and size of label elements
http://www.safeworkaustralia.gov.au/sites/SWA/about/Publications/Documents/643/COP_Labelling_of_Workplace_Hazardous_Chemicals.pdf

[3] European Chemicals Agency "Classification and Labelling Inventory".
http://echa.europa.eu/information-on-chemicals/cl-inventory-database

[4] Safe Work Australia "Hazardous Substances Information System".
http://hsis.safeworkaustralia.gov.au/GHSInformation/GHS_Hazardous_Chemical_Information_List

[5] RiskAssess "GHS data for solutions".
http://www.riskassess.com.au/docs/GHSdataSolutions.pdf