



Practical Tips for SDS Authoring

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Before you begin...



Questions to Consider: Regulatory Requirements

What country are you preparing the SDS for?

Are there any guidance documents available beyond what is stated in the regulatory text?

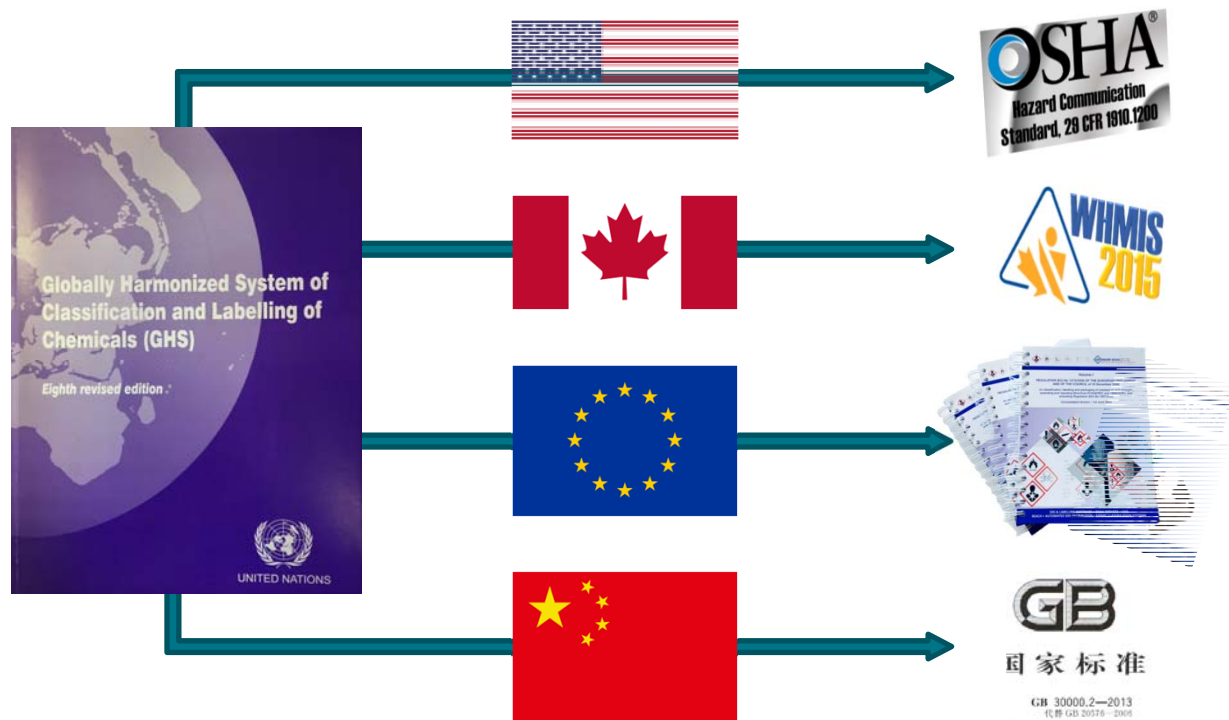
Have they implemented GHS yet? If so, what version of the Purple Book is the country operating against?

Does the country have published GHS classifications and if so, are they mandatory or suggested?

Are translations necessary?



GHS Implementation



Single standard covering C&L, SDS

Single standard covering C&L, SDS

GHS split into two regulations; i.e., CLP and REACH

GHS split into many separate 'GB' standards



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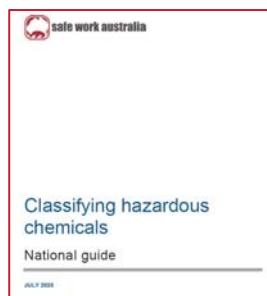
Guidance Materials?



Australia Model Code of Practice on the Preparation of Safety Data Sheets for Hazardous Chemicals (2011; last amended July 2020):
https://www.safeworkaustralia.gov.au/sites/default/files/2020-09/model_code_of_practice_preparation_of_safety_data_sheets_for_hazardous_chemicals.pdf



Australia Model Code of Practice on the Labelling of Workplace Substances (2011; last amended July 2020):
https://www.safeworkaustralia.gov.au/sites/default/files/2020-09/model_code_of_practice_labelling_of_workplace_hazardous_chemicals.pdf



Australia Classifying Hazardous Chemicals – National Guide (last amended 2020):
https://www.safeworkaustralia.gov.au/sites/default/files/2020-07/classifying_hazardous_chemicals_national_guide.pdf

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Suggested or Mandatory Classifications?

Australia

China

European Union

Indonesia

Japan

Malaysia

New Zealand

South Korea

Taiwan

Thailand

Mandatory Classifications

China

European Union

- Annex 6, Table 3 classifications are considered mandatory.
- These published classifications are considered a minimum classification for the endpoints of acute toxicity and STOT RE.

Malaysia

South Korea

- Classifications for MOE designated toxic chemicals are mandatory.

Published Justification?

Australia

China

European Union

Indonesia

Japan

Malaysia

New Zealand

South Korea

Taiwan

Thailand

Published Justification?

Australia

China

European Union

Indonesia

Japan

Malaysia

New Zealand

South Korea

Taiwan

Thailand

Toluene: Published GHS classifications

| | AU | Brazil | Canada | China | EU | Japan | Korea-MOE | Korea-OSHA | Korea-MPSS | Malaysia | NZ | Taiwan | Thailand |
|---|----|--------|--------|-------|----|-------|-----------|------------|------------|----------|----|--------|----------|
| Flammable liquid category 2 | X | X | X | X | X | X | X | X | X | X | X | X | X |
| Acute toxicity oral category 4 | | | | | | | | | | | X | X | |
| Acute toxicity oral category 5 | | | | | | | | | | | | | X |
| Acute toxicity inhalation category 4 | | X | | | | X | | X | | | X | | X |
| Skin Corrosion/irritation category 2 | X | X | X | X | X | X | X | X | | X | X | X | X |
| Serious eye damage/eye irritation category 2 | | | | | | | | | | | X | | |
| Serious eye damage/eye irritation category 2A | | | | | | | | X | | | | X | |
| Serious eye damage/eye irritation category 2B | | X | | | | X | | | | | | | X |
| Reproductive toxicity category 1A | X | X | | X | | X | | X | | | | | X |
| Reproductive toxicity category 2 | | | X | X | X | | X | X | | X | X | X | |
| STOT single exposure category 1 | | X | | | | X | | | | | | | X |
| STOT single exposure category 3 | X | X | X | X | X | X | X | X | | X | | | X |
| STOT repeated exposure category 1 | | X | | | | X | | | | | | | X |
| STOT repeated exposure category 2 | X | | X | X | X | | X | X | | X | X | X | |
| Aspiration hazard category 1 | X | X | X | X | X | X | X | X | | X | | X | X |
| Hazardous to the aquatic environment (acute) category 2 | | | | X | | X | | | | X | | | |
| Hazardous to the aquatic environment (chronic) category 3 | | | | X | | X | | | | | | X | |
| Hazardous to the aquatic environment (chronic) category 4 | | | | | | | | | | | X | | |
| Terrestrial vertebrates ecotoxicity category 3 | | | | | | | | | | | X | | |

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EU Official Languages?

ECHA
EUROPEAN CHEMICALS AGENCY

Languages required for labels and safety data sheets

| Country | Language 1 | Language 2 | Language 3 |
|-----------------------|----------------------|----------------------|------------|
| Austria | German | | |
| Belgium ¹⁾ | French | Dutch | German |
| Bulgaria | Bulgarian | | |
| Croatia | Croatian | | |
| Cyprus | Greek | | |
| Czech Republic | Czech | | |
| Denmark | Danish | | |
| Estonia | Estonian | | |
| Finland | Finnish | Swedish | |
| France | French | | |
| Germany | German | | |
| Greece | Greek | | |
| Hungary | Hungarian | | |
| Iceland | Icelandic | | |
| Ireland | English | | |
| Italy | Italian | | |
| Latvia | Latvian | | |
| Liechtenstein | German | | |
| Lithuania | Lithuanian | | |
| Luxembourg | German ²⁾ | French ²⁾ | |
| Malta | Maltese | English | |
| Netherlands | Dutch | | |
| Norway | Norwegian | | |
| Poland | Polish | | |
| Portugal | Portuguese | | |

| Country | Language 1 | Language 2 | Language 3 |
|---------------------------|------------|------------|------------|
| Romania | Romanian | | |
| Slovakia | Slovakian | | |
| Slovenia | Slovenian | | |
| Spain | Spanish | | |
| Sweden | Swedish | | |
| Switzerland ³⁾ | German | French | Italian |
| United Kingdom | English | | |

¹⁾ Please check with the local authorities, requirements can vary depending on region.

²⁾ German OR French

³⁾ The labelling must be written in at least two official languages. With the agreement of individual professional final users, a substance for supply to these final users may be labelled in only one official language or in English. SDS must be provided in the official languages as requested by the customer or, by mutual agreement, in another language; the annex to the safety data sheet may be written in English.

http://echa.europa.eu/documents/10162/13562/languages_required_for_labels_and_sds_en.pdf



Questions to Consider: SDS Requirements

Is a standard 16 section format required?

What are the requirements for an emergency phone number?

What are the requirements for disclosure of ingredients in Sections 3 and 8?

- Confidentiality provisions?
- Concentration requirements?

Format

If a country has implemented GHS, the SDS is a 16-section format but some countries have special *formatting* requirements to consider.



China SDS Format

Header of the first page should include:

- The title “Chemical Safety Data Sheet” in bold and larger size
- Chemical name
- The latest revision date
- The initial preparation date
- A statement “The SDS is prepared in accordance with **GB/T 16483** and **GB/T 17519**”
- SDS serial number (if available)
- SDS version number (if available)

All other pages should specify the chemical name, revision date and the SDS code if applicable.

China SDS Format

Example: Header of First Page

| | |
|---------------------------------------|--|
| Chemical Safety Data Sheet | |
| Product name: xxxxxxxx | Compliant with GB/T 16483 and GB/T 17519 |
| Revision date: 2013-12-20 | SDS code: xxxxx-xxx |
| Original preparation date: 2011-11-20 | Version: 2.1 |

Example: Header of Other Pages

| | |
|---------------------------|---------------------|
| Product name: xxxxxxxx | SDS code: xxxxx-xxx |
| Revision date: 2013-12-20 | |

EU SDS Requirements: Annex II of REACH

The date of compilation of the SDS shall be given on the first page.

All pages shall be numbered and shall bear either an indication of the length of the SDS (*such as page 1 of 3*) or an indication whether there is a page following (*such as 'Continued on next page' or 'End of safety data sheet'*).

16 section headers - Article 31(6)

Subheadings also listed except for Section 3, where only subsections 3.1 or 3.2 need to be included as appropriate

EU Regulation (EC) No 1907/2006 (REACH)

EU SDS Format: Headings and Subheadings

SECTION 1: Identification of the substance/mixture and of the company/undertaking

- 1.1. Product identifier
- 1.2. Relevant identified uses of the substance or mixture and uses advised against
- 1.3. Details of the supplier of the safety data sheet
- 1.4. Emergency telephone number

SECTION 2: Hazards identification

- 2.1. Classification of the substance or mixture
- 2.2. Label elements
- 2.3. Other hazards

SECTION 12: Ecological information

- 12.1. Toxicity
- 12.2. Persistence and degradability
- 12.3. Bioaccumulative potential
- 12.4. Mobility in soil
- 12.5. Results of PBT and vPvB assessment
- 12.6. Endocrine disrupting properties
- 12.7. Other adverse effects

EU Section 2

2.1 - Classification of the substance or mixture

If the mixture does not meet the criteria for classification in accordance with the CLP, this shall be clearly stated

2.2 - Label elements

Hazard pictogram(s)

Signal word(s)

Hazard statement(s) (H and EUH) in full or given in section 16 if not here

Precautionary statement(s) in full

Not more than six precautionary statements shall appear on the label, unless necessary to reflect the nature and the severity of the hazards (CLP Article 28 (3))

Any additional applicable label statement (supplemental information on the label, CLP Article 25)

Authorisation number (if an authorization has been granted)

2.3 - Other hazards

e.g., dust explosion hazard, substance meets the BPT or vPvB criteria



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- Concentration requirements?

Section 1: Emergency Response Telephone Number

Ring in country, i.e., Brazil, New Zealand

Answer in native language, i.e., Korea, Mexico, Uruguay

Approved by government, i.e., China National Registration Center for Chemicals (NRCC)

Silent on requirements, i.e., United States



Questions to Consider: SDS Requirements

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What are the requirements for an emergency phone number?

What are the requirements for disclosure of ingredients in Sections 3 and 8?

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- Concentration requirements?

Section 3: US Disclosure

| | | |
|----|--|---|
| 3. | Composition/ information on ingredients | <p>Except as provided for in paragraph (i) of §1910.1200 on trade secrets:</p> <p>For Substances</p> <ul style="list-style-type: none">(a) Chemical name;(b) Common name and synonyms;(c) CAS number and other unique identifiers;(d) Impurities and stabilizing additives which are themselves classified and which contribute to the classification of the substance. <p>For Mixtures</p> <p>In addition to the information required for substances:</p> <ul style="list-style-type: none">(a) The chemical name and concentration (exact percentage) or concentration ranges of all ingredients which are classified as health hazards in accordance with paragraph (d) of §1910.1200 and<ul style="list-style-type: none">(1) Are present above their cut-off/concentration limits; or(2) Present a health risk below the cut-off/concentration limits.(b) The concentration (exact percentage) shall be specified unless a trade secret claim is made in accordance with paragraph (i) of §1910.1200, when there is batch-to-batch variability in the production of a mixture, or for a group of substantially similar mixtures (<i>See A.0.5.1.2</i>) with similar chemical composition. In these cases, concentration ranges may be used. |
|----|--|---|

Section 3: EU Disclosure

3.2.1. For a mixture meeting the criteria for classification in accordance with Regulation (EC) No 1272/2008, the following substances (see also Table 1.1) shall be indicated, together with their concentration or concentration range in the mixture:

- (a) substances presenting a health or environmental hazard within the meaning of Regulation (EC) No 1272/2008, if those substances are present in concentrations equal to or greater than the lowest of any of the following:
 - (i) the generic cut-off values set out in Table 1.1 of Annex I to Regulation (EC) No 1272/2008;
 - (ii) the generic concentration limits given in parts 3 to 5 of Annex I to Regulation (EC) No 1272/2008, taking into account the concentrations specified in the notes to certain tables in part 3 in relation to the obligation to make available a safety data sheet for the mixture upon request, and for aspiration hazard (Section 3.10 of Annex I to Regulation (EC) No 1272/2008) ≥ 1 %;
 - (iii) the specific concentration limits given in Part 3 of Annex VI to Regulation (EC) No 1272/2008;

5.6.2020

EN

Official Journal of the European Union

L 203/35

- (iv) if a M-factor has been given in Part 3 of Annex VI to Regulation (EC) No 1272/2008, the generic cut-off value in Table 1.1 of Annex I to that Regulation, adjusted using the calculation set out in Section 4.1 of Annex I to that Regulation;
- (v) the specific concentration limits provided to the classification and labelling inventory established under Regulation (EC) No 1272/2008;
- (vi) one tenth of the specific concentration limit for a substance classified as skin sensitiser or respiratory sensitiser with a specific concentration limit;
- (vii) the concentration limits set out in Annex II to Regulation (EC) No 1272/2008;
- (viii) if an M-factor has been provided to the classification and labelling inventory established under Regulation (EC) No 1272/2008, the generic cut-off value in Table 1.1 of Annex I to that Regulation, adjusted using the calculation set out in Section 4.1 of Annex I to that Regulation;

Section 3: EU Disclosure

| | | |
|----------|--|---|
| 3.2.1. | <p>For a mixture meeting the criteria for classification in accordance with Regulation (EC) No 1272/2008, the following substances (see also Table 1.1) shall be indicated, together with their concentration or concentration range in the mixture:</p> <p>(a) substances presenting a health or environmental hazard within the meaning of Regulation (EC) No 1272/2008, if those substances are present in concentrations equal to or greater than the lowest of any of the following:</p> <p>(i) the generic cut-off values set out in Table 1.1 of Annex I to Regulation (EC) No 1272/2008;</p> <p>(ii) the generic concentration limits given in parts 3 to 5 of Annex I to Regulation (EC) No 1272/2008, taking into account the concentrations specified in the notes to certain tables in part 3 in relation to the obligation to make available a safety data sheet for the mixture upon request, and for aspiration hazard (Section 3.10 of Annex I to Regulation (EC) No 1272/2008) ≥ 1 %;</p> <p>(iii) the specific concentration limits given in Part 3 of Annex VI to Regulation (EC) No 1272/2008;</p> | |
| 5.6.2020 | EN | Official Journal of the European Union |
| | | <p>(b) substances for which there are Union workplace exposure limits which are not already included under point (a);</p> <p>(c) provided that the concentration of an individual substance is equal to or greater than 0,1 %, substances that meet any of the following criteria:</p> <ul style="list-style-type: none">— substances that are persistent, bioaccumulative and toxic or very persistent and very bioaccumulative in accordance with the criteria set out in Annex XIII,— substances included in the list established in accordance with Article 59(1) for reasons other than the hazards referred to in point (a) of this subsection such as endocrine disrupting properties,— substances identified as having endocrine disrupting properties in accordance with the criteria set out in Delegated Regulation (EU) 2017/2100 or Regulation (EU) 2018/605. <p>(iv) if a M-factor has been given in Part 3 of Annex VI to Regulation (EC) No 1272/2008, the generic cut-off value in Table 1.1 of Annex I to that Regulation, adjusted using the calculation set out in Section 4.1 of Annex I to that Regulation;</p> <p>(v) the specific concentration limits provided to the classification and labelling inventory established under Regulation (EC) No 1272/2008;</p> <p>(vi) one tenth of the specific concentration limit for a substance classified as skin sensitiser or respiratory sensitiser with a specific concentration limit;</p> <p>(vii) the concentration limits set out in Annex II to Regulation (EC) No 1272/2008;</p> <p>(viii) if an M-factor has been provided to the classification and labelling inventory established under Regulation (EC) No 1272/2008, the generic cut-off value in Table 1.1 of Annex I to that Regulation, adjusted using the calculation set out in Section 4.1 of Annex I to that Regulation;</p> |

Data Issues



External Sources of data

Test data are more reliable than supplier SDS

Being able to include data in your SDS helps support your classification

Know the difference between a data source and a resource aggregator

Aggregators link to data sources and can save you search time

NLM > ChemIDplus > Substance

Registry Number | equals | 50-00-0 | Search

Download | Start New Query | Modify Query | Search History

Switch to Summary View

Substance Name: Formaldehyde [USP]
RN: 50-00-0
UNII: 1HG84L3525
InChIKey: WSFSSNUMVMOOMR-UHFFFAOYSA-N

Note
A highly reactive aldehyde gas formed by oxidation or incomplete combustion of hydrocarbons. In solution, it has a wide range of uses: in the manufacture of resins and textiles, as a disinfectant, and as a laboratory fixative or preservative. Formaldehyde solution (formalin) is considered a hazardous compound, and its vapor toxic. (From Reynolds, Martindale The Extra Pharmacopoeia, 30th ed, p717)

Molecular Formula
C-H2-O

Molecular Weight
30.0258

Chemical structure: C=O

All | Classifications | Links to Resources | Names & Synonyms | Registry Numbers | Structure Descriptors | Toxicity | Physical Properties

Classification Codes

| | | | |
|--|--|--|--|
| <input type="checkbox"/> Agricultural Chemical | <input type="checkbox"/> Disinfectants | <input type="checkbox"/> Human Data | <input type="checkbox"/> Reproductive Effect |
| <input type="checkbox"/> Anti-Infective Agents | <input type="checkbox"/> Fixatives | <input type="checkbox"/> Insecticide | <input type="checkbox"/> Skin / Eye Irritant |
| <input type="checkbox"/> Disinfectant | <input type="checkbox"/> Fungicide, Bactericide, Wood Preservative | <input type="checkbox"/> Mutation Data | <input type="checkbox"/> Tumor Data |

Superlist Classification Codes

| | | | |
|---|---|--|---|
| <input type="checkbox"/> 2007 CERCLA Priority List, Rank: 244 | <input type="checkbox"/> Ceiling (0.3 ppm) Sensitizer, Suspected human carcinogen | <input type="checkbox"/> Reasonably Anticipated to be a Carcinogen | <input type="checkbox"/> Threshold Planning Quantity (TPQ) = 500 lb |
| <input type="checkbox"/> 2011 CERCLA Priority List, Rank: 241 | <input type="checkbox"/> Overall Carcinogenic Evaluation: Group 1 | <input type="checkbox"/> Reportable Quantity (RQ) = 100 lb | <input type="checkbox"/> TWA see 1910.1048 |

Links to Resources

NLM Resources (File Locators)

| | | | |
|---|---|--|--|
| <input type="checkbox"/> CCRIS | <input type="checkbox"/> GENETOX | <input type="checkbox"/> MeSH Heading | <input type="checkbox"/> PubMed Central |
| <input type="checkbox"/> ClinicalTrials.gov | <input type="checkbox"/> HSDB | <input type="checkbox"/> PubChem | <input type="checkbox"/> PubMed Toxicology |
| <input type="checkbox"/> DailyMed | <input type="checkbox"/> ITER | <input type="checkbox"/> PubMed | <input type="checkbox"/> Tox Town |
| <input type="checkbox"/> DART | <input type="checkbox"/> MedlinePlusAll | <input type="checkbox"/> PubMed AIDS | <input type="checkbox"/> TOXLINE |
| <input type="checkbox"/> DrugPortal | <input type="checkbox"/> MeSH | <input type="checkbox"/> PubMed Cancer | <input type="checkbox"/> WebWISER |

Regulatory Agencies (Superlist Locators)

| | | | |
|------------------------------|-------------------------------------|-------------------------------|---------------------------------|
| <input type="checkbox"/> CAS | <input type="checkbox"/> IARC | <input type="checkbox"/> NTPA | <input type="checkbox"/> S110 |
| <input type="checkbox"/> CA1 | <input type="checkbox"/> Marine CHC | <input type="checkbox"/> PA | <input type="checkbox"/> S302 |
| <input type="checkbox"/> DOT | <input type="checkbox"/> MTL | <input type="checkbox"/> PAPA | <input type="checkbox"/> TRI |
| <input type="checkbox"/> DSL | <input type="checkbox"/> NJ | <input type="checkbox"/> PEL | <input type="checkbox"/> TSCAIV |
| <input type="checkbox"/> HPV | <input type="checkbox"/> NJEH | <input type="checkbox"/> RQ | <input type="checkbox"/> WHMI |



Reading Data

Some data don't support listed or accepted classifications (e.g. Ethylene Glycol or Methanol)

EU Classifications can't always be relied on – understand the difference between “mandatory” classifications, self-classifications, and data

Check Reliability Ratings (1 or 2 are the best) and look at “experimental result” versus “read-across”

The screenshot displays the ECHA REACH database entry for Coumarin. The page is titled 'Coumarin' and includes the EC number (202-086-7) and CAS number (91-64-5). A navigation menu on the left lists various categories such as General information, Classification & Labelling & PBT assessment, and Environmental fate & pathways. The main content area is focused on 'Eye irritation', showing a dropdown menu for '001 Key | Experimental result'. Below this, there are sections for 'Administrative data' and 'Data source'. The 'Administrative data' section includes fields for Endpoint (eye irritation: in vivo), Type of information (experimental study), Adequacy of study (key study), Reliability (1 (reliable without restriction)), and Rationale for reliability incl. deficiencies (other: Testing report according to National Act method). The 'Data source' section shows Reference Type (study report), Title (Unnamed), and Year (1979). The 'Materials and methods' section includes a Test guideline (EPA OPP 81-4 (Acute Eye Irritation)) and Qualifier (equivalent or similar to).



Beware the Regional Differences

Since the EU didn't adopt some endpoints the US did, there can be missing classifications

Mandatory classification of carcinogens under OSHA and advised classification of IARC and NTP carcinogens.

Use of this information is subject to copyright laws and may require the permission of the owner of the information, as described in the ECHA Legal Notice

Coumarin

EC number: 202-086-7 CAS number: 91-64-5

- General information
- Classification & Labelling & PBT assessment
- Manufacture, use & exposure
- Physical & Chemical properties
- Environmental fate & pathways
- Ecotoxicological information
- Toxicological information
- Analytical methods
- Guidance on safe use
- Assessment reports
- Reference substances

- Toxicological Summary
- Toxicokinetics, metabolism and distribution
- Acute Toxicity
- Irritation / corrosion
 - Endpoint summary
 - Skin irritation / corrosion
 - Eye irritation
- Sensitisation
- Repeated dose toxicity
- Genetic toxicity
- Carcinogenicity
- Toxicity to reproduction
 - Specific investigations
 - Exposure related observations in humans
 - Toxic effects on livestock and pets
 - Additional toxicological data

Eye irritation

Currently viewing: 001 Key | Experimental result

Administrative data Data source Materials and methods Results and discussion

Applicant's summary and conclusion

Administrative data

| | |
|---|--|
| Endpoint: | eye irritation: in vivo |
| Type of information: | experimental study |
| Adequacy of study: | key study |
| Reliability: | 1 (reliable without restriction) |
| Rationale for reliability incl. deficiencies: | other: Testing report according to National Act method |

Data source

| | |
|-----------------|--------------|
| Reference Type: | study report |
| Title: | Unnamed |
| Year: | 1979 |

Materials and methods

| | |
|----------------|-------------------------------------|
| Test guideline | |
| Qualifier: | equivalent or similar to |
| Guideline: | EPA OPP 81-4 (Acute Eye Irritation) |



Beware the C&L

Summary of Classification and Labeling

| Notified classification and labelling | | |
|---------------------------------------|-------|------------|
| General Information | | |
| EC / List no. | Name | CAS Number |
| 231-791-2 | Water | 7732-18-5 |

Notified classification and labelling according to CLP criteria

| Classification | Labelling | | | Specific Concentration limits, M-Factors | Notes | Classification affected by Impurities / Additives | Additional Notified Information | Number of Notifiers | Joint Entries |
|----------------|-----------------------------------|--------------------------|--|--|------------|---|---------------------------------|---------------------|------------------------------|
| | Hazard Class and Category Code(s) | Hazard Statement Code(s) | Supplementary Hazard Statement Code(s) | | | | | | |
| Not Classified | | | | | | | | 1813 | |
| | | H302 | | GHS05 | | | | 2 | View details |
| | | H318 | | GHS07 Dgr | | | | | |
| | | NA | | | | | | 1 | View details |
| Flam. Liq. 3 | H226 | H226 | | GHS02 Wng | | | State/Form | 1 | View details |
| Not Classified | | | | | | ✓ | | 1 | |
| | | H314 | | GHS05 Dgr | | | State/Form | 1 | View details |
| Acute Tox. 3 | H301 | H301 | | GHS05 GHS06 Dgr | | | | | |
| Skin Corr. 1A | H314 | | | | State/Form | 1 | View details | | |
| Acute Tox. 2 | H330 | | | | | | | | |
| | | H411 | | | | ✓ | State/Form | 1 | View details |



What data do you need?

Flash point only applies to liquids.

pH only is relevant for liquids (though you may have pH data for a solution made from the solid.)

Viscosity is important for aspiration toxicity.

Be sure to include the color and form of the material.

| 2.1 Information on Basic Physical and Chemical Properties | |
|---|----------------------|
| Appearance: | Dark purple liquid. |
| Odor: | Characteristic odor. |

If you are using ingredient data, be sure to indicate it.

| |
|--|
| LEL: 2.2 (Ethyl Acetate) UEL: 36 (Methanol) |
|--|



Indicating data sources

In Sections 11 and 12, make sure the data you list support your classification.

Publicly available data can be listed, but if your product has been tested as a whole, indicate that.

Toxicological Data:

Data from laboratory studies conducted are summarized below:

Oral: Rat LD₅₀: 654 mg/kg (female) (estimated based on mortalities for doses tested)

Dermal: Rat LD₅₀: >5,000 mg/kg

Inhalation: Rat 4-hr LC₅₀: >2.03 mg/L (no mortalities at highest dose tested)

Eye Irritation: Rabbit: Mildly irritating (MMTS = 23.3)

Skin Irritation: Rabbit: Moderately irritating (PDII = 5.3)

Skin Sensitization: Not a contact sensitizer in guinea pigs following repeated skin exposure.





Classification Considerations

Questions to Consider: Classification

What building blocks are included and excluded?

What are the thresholds for mixture classification for?

- Respiratory/skin sensitizers
- Carcinogens category 2
- Reproductive toxicity
- Systemic Target Organ Toxicity - Single Exposure - category 2
- Systemic Target Organ Toxicity - Repeated Exposure - category 2

Flammable Gases.....

Table 2.2.2: Label elements for flammable gases

| | Category 1 | Category 2 |
|------------------|-------------------------|---------------|
| Symbol | Flame | No symbol |
| Signal word | Danger | Warning |
| Hazard statement | Extremely flammable gas | Flammable gas |

← First edition through Revision 3

Table 2.2.3: Label elements for flammable gases (including chemical unstable gases)

| | Flammable gas | | Chemically unstable gas | |
|------------------|-------------------------|---------------|--|--|
| | Category 1 | Category 2 | Category A | Category B |
| Symbol | Flame | No symbol | No additional symbol | No additional symbol |
| Signal word | Danger | Warning | No additional signal word | No additional signal word |
| Hazard statement | Extremely flammable gas | Flammable gas | May react explosively even in the absence of air | May react explosively even in the absence of air at elevated pressure and/or temperature |

← Revisions 4 and 5

Flammable Gases.....

Table 2.2.4: Label elements for flammable gases

| | Flammable gas | | Additional sub-categories | | |
|------------------|-------------------------|---------------|--|--|--|
| | Category 1 | Category 2 | Pyrophoric gas | Chemically unstable gas | |
| | | | Pyrophoric gas | Category A | Category B |
| Symbol | Flame | No symbol | Flame | No additional symbol | No additional symbol |
| Signal word | Danger | Warning | Danger | No additional signal word | No additional signal word |
| Hazard statement | Extremely flammable gas | Flammable gas | May ignite spontaneously if exposed to air | May react explosively even in the absence of air | May react explosively even in the absence of air at elevated pressure and/or temperature |

← Revision 6

Table 2.2.2: Label elements for flammable gases

| | Category 1A | Gases categorized as 1A by meeting pyrophoric or unstable gas A/B criteria | | | Category 1B | Category 2 |
|------------------|-------------------------|--|---|---|---------------|---------------|
| | | Pyrophoric gas | Chemically unstable gas | | | |
| | | | Category A | Category B | | |
| Symbol | Flame | Flame | Flame | Flame | Flame | No symbol |
| Signal word | Danger | Danger | Danger | Danger | Danger | Warning |
| Hazard statement | Extremely flammable gas | Extremely flammable gas. May ignite spontaneously if exposed to air | Extremely flammable gas. May react explosively even in the absence of air | Extremely flammable gas. May react explosively even in the absence of air at elevated pressure and/or temperature | Flammable gas | Flammable gas |

← Revisions 7 and 8

Flammable Aerosols or Aerosols?

Table 2.3.1: Label elements for flammable aerosols

| | Category 1 | Category 2 |
|-------------------------|-----------------------------|-------------------|
| Symbol | Flame | Flame |
| Signal word | Danger | Warning |
| Hazard statement | Extremely flammable aerosol | Flammable aerosol |

← First edition through Revision 3

Table 2.3.1: Label elements for flammable and non-flammable aerosols

| | Category 1 | Category 2 | Category 3 |
|-------------------------|---|---|--|
| Symbol | Flame | Flame | <i>No symbol</i> |
| Signal word | Danger | Warning | Warning |
| Hazard statement | Extremely flammable aerosol Pressurized container: May burst if heated | Flammable aerosol Pressurized container: May burst if heated | Pressurized container: May burst if heated |

← Revisions 4, 5, 6 and 7



| P Code | Rev 3 and Earlier Text | Rev 4 and Higher Text |
|--------|--|--|
| P223 | Keep away from any possible contact with water, because of violent reaction and possible flash fire. | Do not allow contact with water. |
| P244 | Keep reduction valves free from grease and oil. | Keep valves and fittings free from oil and grease. |
| P340 | Remove victim to fresh air and keep at rest in a position comfortable for breathing. | Remove person to fresh air and keep comfortable for breathing. |

Added Building Blocks?

United States

- Combustible dust
- Pyrophoric gas
- Simple asphyxiant

Canada

- Combustible dust
- Pyrophoric gas
- Simple asphyxiant
- Water reactive releasing toxic gas

Excluded Building Blocks?

United States

- Acute toxicity category 5
- Skin corrosion/irritation category 3
- Aspiration hazard category 2
- Hazardous to the aquatic environment (acute) - all categories
- Hazardous to the aquatic environment (long term) - all categories
- Hazardous to the ozone layer

European Union

- Flammable liquid category 4
- Acute toxicity category 5
- Skin corrosion/irritation category 3
- Aspiration hazard category 2
- Acute aquatic toxicity categories 2 and 3

Questions to Consider: Classification

What building blocks are included and excluded?

What are the thresholds for mixture classification for?

- Respiratory/skin sensitizers
- Carcinogens category 2
- Reproductive toxicity
- Systemic Target Organ Toxicity - Single Exposure - category 2
- Systemic Target Organ Toxicity - Repeated Exposure - category 2

Different Classification Thresholds?

United States

TABLE A.8.2—CUT-OFF VALUES/CONCENTRATION LIMITS OF INGREDIENTS OF A MIXTURE CLASSIFIED AS A SPECIFIC TARGET ORGAN TOXICANT THAT WOULD TRIGGER CLASSIFICATION OF THE MIXTURE AS CATEGORY 1 OR 2

| Ingredient classified as: | Cut-off values/concentration limits triggering classification of a mixture as: | |
|----------------------------------|--|------------|
| | Category 1 | Category 2 |
| Category 1 Target organ toxicant | ≥1.0% | |
| Category 2 Target organ toxicant | | ≥1.0% |

European Union

Table 3.8.3

Generic concentration limits of ingredients of a mixture classified as a specific target organ toxicant that trigger classification of the mixture as Category 1 or 2

| Ingredient classified as: | Generic concentration limits triggering classification of the mixture as: | |
|---|---|---------------------------------|
| | Category 1 | Category 2 |
| Category 1 Specific Target Organ Toxicant | Concentration ≥ 10 % | 1,0 % ≤ concentration < 10 % |
| Category 2 Specific Target Organ Toxicant | | Concentration ≥ 10 % [(Note 1)] |

Note 1

If a Category 2 specific target organ toxicant is present in the mixture as an ingredient at a concentration ≥ 1,0 % a SDS shall be available for the mixture upon request.

Putting it all together....

United States

Flammable liquid category 4

STOT SE category 1

Not classified

European Union

Not classified

STOT SE category 2

Aerosol category 3



Emergency Response and Safe Handling



Section 10 - Explained

Reactivity – Is the material reactive or not? If it is normally stable and non-self-reactive during normal conditions of storage in use, it is not reactive. If it isn't normally stable, say it can react and describe the instability in one of the later sections.

Chemical Stability – Whether the product is stable or unstable under normal ambient and anticipated storage and handling conditions. For example, certain ethers (like isopropyl ether) may form unstable peroxides in storage.

Possibility of Hazardous Reactions – If the product will polymerize or react, releasing excess pressure or heat or other hazards. Acetylene will self-polymerize and explode if it isn't properly inhibited.

Conditions to Avoid – Physical conditions (like heat, pressure, or shock) that may create a hazardous situation. For example, hygroscopic materials may absorb moisture and become useless.

Incompatible Material – Chemicals with which the product may react in a hazardous way. For example, acids and bases.

Hazardous Decomposition Products – Hazardous decomposition products that may be released during use, storage, or heating. Similar but not identical to Hazardous Combustion Products (in Section 5.)

Recommendations for Fires, Spill, First Aid

Take into consideration the form of the material – don't recommend sweeping up a material that's a liquid.

Take into consideration any incompatibilities.

Remember your chemistry and don't make the situation worse (don't dilute a strong base with a strong acid.)

Make your responses consistent with your classification.

If your material isn't flammable, don't recommend removing all sources of heat, sparks or flames in case of a spill.

If your product isn't classified as causing eye irritation or damage, don't recommend immediate medical attention for eye contact.

Be consistent!



Where to Find Fire and Spill Response

Fire:

North America Emergency Response Guide

NFPA Fundamentals of Fire Fighter Skills

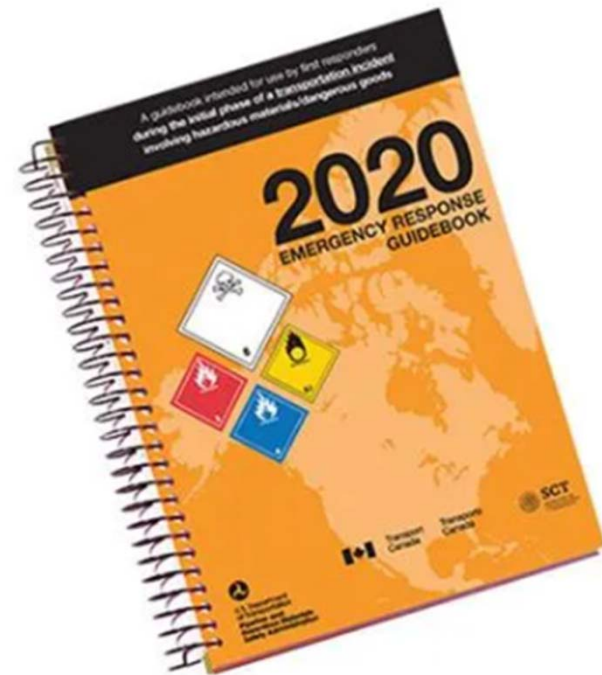
NFPA Fire Protection Guide to Hazardous Materials

On-Line Databases

Spill:

North America Emergency Response Guide

On-Line Databases



First Aid

First Aid:

GHS Rev 4

CCOHS The SDS a Guide to First- Aid Recommendations

<http://www.ccohs.ca/products/publications/firstaid/>

OSHA Topic Page

<http://www.osha.gov/SLTC/medicalfirstaid/index.html>



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 - in
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 - Changing Text Size in Browsers
 - Transparency

>The Safety Data Sheet □ A Guide to First-Aid Recommendations

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Last updated December 2012

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And of course – SCHC!





Section 15: United States and International

Section 15: United States

Not a mandatory section thus minimal requirements stated, and no additional guidance provided

| | | |
|-----|---|--|
| 15. | Regulatory information (Non-mandatory) | Safety, health and environmental regulations specific for the product in question. |
|-----|---|--|

Best practice: include what makes sense for your product

Typical Inclusions

Regulatory status at US federal level

- TSCA inventory status
- SARA 311/312 classifications

Regulatory status at US state level

- California Proposition 65 status
- Other state RTK status

Regulatory status at international level

- Inventory status for countries other than US that have inventories, i.e., Australia, Canada, China, Japan, Korea, New Zealand, Philippines, Taiwan

SARA 311/312

Amended for reporting year 2017:

| Physical hazards | Health hazards |
|---|--|
| Flammable (gases, aerosols, liquids, or solids) Gas under pressure Explosive Self-heating Pyrophoric (liquid or solid) Oxidizer (liquid, solid or gas) Organic peroxide Self-reactive Pyrophoric gas Corrosive to metal In contact with water emits flammable gas Combustible Dust Hazard Not Otherwise Classified (HNOC) | Carcinogenicity. Acute toxicity (any route of exposure). Reproductive toxicity. Skin Corrosion or Irritation. Respiratory or Skin Sensitization. Serious eye damage or eye irritation. Specific target organ toxicity (single or repeated exposure). Aspiration Hazard. Germ cell mutagenicity. Simple Asphyxiant. Hazard Not Otherwise Classified (HNOC). |

International Considerations

International Inventories:

US, Canada, China, Australia, Philippines, Taiwan, New Zealand.

Europe and Korea have registration-based systems that may not be easily defined.

International Regulations

Canadian Environmental Protection Act: All of the components of this product are listed on the DSL.

European Inventory of Existing Chemicals (EINECS): All of the components of this product are listed on EINECS.

EU REACH: All components requiring registration have been pre-registered.

Australian Inventory of Chemical Substances: All of the components of this product are listed on AICS.

Philippine Inventory of Chemicals and Chemical Substances: All of the components of this product are listed on PICCS.



Other International Regulations

Many countries have multiple other regulations that may apply a SDS.

KOREAN REGULATIONS

Korea - ISHA - Harmful Agents Subject to Work Environment Monitoring: None

Korea - ISHA - Harmful Agents Subject to Workers Requiring Health Examination: None

Korea National Chemical Information System (NCIS):

| Toxic Chemicals | Observation Chemicals | Restricted or Banned Chemicals |
|-----------------|-----------------------|--------------------------------|
| None | None | None |

TAIWAN REGULATIONS

Labor Safety and Health Act: Brewer Science, Inc. complies with this regulation as applicable.

Standards of Permissible Exposure Limits of Airborne Hazardous Substances in Workplace: This SDS complies with this regulation by listing applicable components with Occupational Exposure Limits in Section 8: Exposure Controls/Personal Protection.

Regulations Governing Road Traffic Safety: Brewer Science, Inc. complies with this regulation as applicable.

Methods and Facilities Standard for the Storage, Clearance and Disposal of Industrial Waste: Brewer Science, Inc. complies with this regulation as applicable. Refer to Section 6: Accidental Release Measures, Section 7: Handling and Storage, and Section 13: Disposal information.

Public Hazardous Substances & Flammable Pressurized Gases Establishment Standards & Safety Control Regulations: This product is classified as a Class 4- Flammable liquid, according to Attachment 1: Class, Type and Control Quantity of Public Hazardous Materials.

JAPANESE REGULATIONS

Industrial Safety and Health Law:

| Manufacture Prohibited | Manufacture Allowed | Notification Obligation | Labeling Obligation | MSDS Obligation | Dangerous Substance |
|------------------------|---------------------|-------------------------|----------------------------|----------------------------|-----------------------------|
| Not applicable | Not applicable | Not applicable | ≥1% (1-Methoxy-2-propanol) | ≥1% (1-Methoxy-2-propanol) | Flammable Substance-Group 4 |

Poisonous and Deleterious Substances Control Law (PDSCL): None of the chemicals are listed.

Pollutant Release and Transfer Register (PRTR): None of the chemicals are listed.

ISHL Prevention of Organic Solvent Poisoning: None of the chemicals are listed.

Law Concerning the Protection of the Ozone Layer: None of the chemicals are listed.

Fire Service Law: Group 4 – Flammable liquids (2nd Class petroleum)

Ship Safety Act: Flammable liquid (Hazard Regulation Article 3, hazardous substance notice appendix 1)



Consider Your Audience

Are universal SDS doable? Yes and no. It depends on the product.

Can you cover all regulations with a single document? Possibly, but possibly not.

Do you understand the regulations well enough to be sure you are listing the information correctly?



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