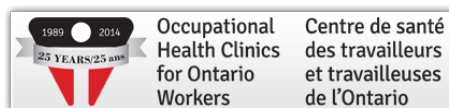


# “Setting Priorities”

## Chemical Hazard Assessment and Prioritization (CHAP)

### Research Partners:



*The “Setting Priorities” project was funded by the Ontario Ministry of Labour*

## **“Setting Priorities”**

### **Chemical Hazard Assessment and Prioritization (CHAP)**

#### **PURPOSE:**

The purpose of CHAP is to assist small to medium sized workplaces to:

1. Better understand the hazards associated with the chemicals they are using; and
2. Prioritize the most ‘hazardous’ chemicals for additional assessment of the effectiveness of control measures which are currently in-place.

#### **BACKGROUND:**

Chemical safety within the workplace is important. However, understanding how hazardous different chemicals are can be difficult. Small and medium-sized workplaces often get much their information on chemicals from the Safety Data Sheets that come with each chemical. The Safety Data Sheets have information on how hazardous the chemical is, and on the correct use of the chemical.

One way of assessing and ranking chemical hazards is through ‘hazard banding’. In this approach, the hazards associated with a chemical are allocated to different ‘hazard bands’. For example, a chemical assigned an “A” ‘hazard band’ is a ‘low’ hazard, up to an “E” ‘hazard band’, which is an ‘extremely high’ hazard. By looking at what ‘hazard band’ a chemical is allocated to, you are able to determine how hazardous the chemical is.

This CHAP tool allows you to use information from Safety Data Sheets to determine the hazard bands of the chemicals you use. However, in the CHAP tool we refer to hazard bands as hazard levels.

#### **INSTRUCTIONS FOR USE:**

Before starting, it is important to make sure you have the following:

1. An inventory of the chemicals/chemical products you have in your workplace
2. Copies of the most up-to-date Safety Data Sheet for each chemical/chemical product, and
3. Current Safety Data Sheets that comply with the requirements of WHMIS 2015

**Note:** as this CHAP tool uses key information from *Section 2 – Hazards Information* of WHMIS 2015 compliant Safety Data Sheets, it is important to ensure that the Safety Data Sheets you have do comply with WHMIS 2015. Information on what WHMIS 2015 requires in Safety Data Sheets is available from CCOHS at: [https://www.ccohs.ca/oshanswers/chemicals/whmis\\_ghs/sds.html](https://www.ccohs.ca/oshanswers/chemicals/whmis_ghs/sds.html)

This CHAP tool has the following three (3) components:

1. **Summary Sheet** – this is used initially to list the chemicals you wish to undertake the CHAP on. However, the hazard level for the chemicals is determined by using the *Hazard Level Assessment* and is then transferred back to the *Summary Sheet* so that the hazard levels of the various chemicals can be compared.

2. **Hazard Level Assessment** – this is used to undertake the hazard assessment on each chemical. As such, separate *Hazard Level Assessment* sheets should be used for each chemical. Once an overall hazard level is determined for a chemical, it should be transferred back to the *Summary Sheet*.
3. **Hazard Statements and Hazard Levels** – Section 2 of Safety Data Sheets contains a subsection titled ‘Hazards Information’. This subsection includes a series of ‘Hazard Statements’. It sometimes also includes ‘Hazard Codes’ for each hazard statement. These Hazard Statements are used to determine the ‘Hazard Levels’ for each chemical by referring to either of the two *Attachments*. If a Safety Data Sheet includes ‘Hazard Codes’, you can use **Attachment A** to identify the ‘Hazard Levels’ as it contains Hazard Statements and their identified ‘hazard levels’ listed numerically by ‘Hazard Code’. Whereas, if you only have ‘Hazard Statements’ you will need to use **Attachment B**. This attachment contains Hazard Statements and their identified ‘hazard levels’ listed alphabetically by hazard statement. Note: if ‘Hazard Codes’ are provided in a Safety Data Sheet, these are the easiest to use.

The ten (10) steps for doing our Chemical Hazard Assessment and Prioritization (CHAP) are:

1. **Identify** the “top 5” chemicals you think are used the most (this can either be by quantity or frequency of use) and **list** them in the *Summary Sheet*.
2. **Identify** the “top 5” chemicals you think are the most hazardous, no matter how much is used, and **list** them in the *Summary Sheet*.
3. **For each** chemical listed in the *Summary Sheet*, **locate** their Safety Data Sheet, and make sure that it is current and complies with WHMIS 2015.
4. **For each** chemical listed in the *Summary Sheet*, **review** Section 2 (titled ‘Hazards Information’) of its Safety Data Sheet. Section 2 of the Safety Data Sheet contains information about the hazards associated with the chemical. Included in this section are ‘hazard statements’ (or H statements) and ‘hazard codes’ (or H codes). For example, one hazard statement is “Causes skin irritation” and the hazard code for this statement is H315. **Locate** the ‘hazard statements’ (and ‘hazard codes’ if they are listed) for the chemical in Section 2 of the Safety Data Sheet.
5. **Use one Hazard Level Assessment** sheet for **each** chemical. **Enter** each ‘hazard statement’ and its ‘hazard code’ (if they are listed), which was identified in Section 2 of the Safety Data Sheet, into the *Hazard Level Assessment*. Notes: (1) include all ‘hazard statements’ with ‘hazard codes’ in the 200’s, 300’s and 400’s; (2) ‘hazard statements’ associated with ‘hazard codes’ in the 200’s or 400’s are assigned the same ‘hazard level’ no matter what the hazard statement/code, whereas ‘hazard levels’ for ‘hazard codes’ in the 300’s are different depending on the hazard statement/code.
6. **Refer** to the *Attachment A* or *Attachment B* for a listing of ‘hazard statements’ and the ‘hazard levels’ allocated for each statement (hazard bands are from A = low hazard to E = extremely high hazard). Attachment A lists the hazard statements numerically by hazard code, and Attachment B lists the hazard statements alphabetically by the first word in the hazard statement. In the tables, there are different ‘hazard levels’ listed for each ‘uptake route’ (that is, the way in which the chemical may enter the body). Once the ‘hazard bands’ for each ‘hazard statement’ are located, **enter** these into the *Hazard Level Assessment* sheet.
7. Once all of the ‘hazard statements’ are entered into the *Hazard Level Assessment* sheet, **record the highest** ‘hazard level’ for **each ‘Uptake Route’**. Note: Hazard Level “A” = least hazardous and Hazard Level “E” = most hazardous.

8. **Identify** the highest 'hazard level' across all of the 'uptake routes'. This is called the 'Highest Hazard Level For All Uptake Routes' for this particular chemical and represents the 'overall hazard level' for the chemical.
9. **Transfer** the 'Highest Hazard Level For All Uptake Routes' for each chemical (as determined by using the *Hazard Level Assessment* sheet for each chemical) back to the *Summary Sheet*. Note: this represents the most hazardous 'Hazard Level' for this chemical.
10. **Review** and **Compare** the 'Hazard Level' ratings of the chemicals listed in the *Summary Sheet* to identify the most hazardous chemicals. This is a starting point for a more detailed risk assessment and review of the existing control measures.

The steps listed above are also described in the *Assessment Flow Chart* on the next page.

#### Things to Remember:

- Hazard levels are provided as a 'letter' rating, with A = low hazard, up to E = extremely high hazard.
- In Attachments A and B, different 'hazard levels' are listed for each 'uptake route' (that is, the way in which the chemical may enter the body) for each 'hazard statement'.
- The overall hazard level for a chemical is the 'Highest Hazard Level For All Uptake Routes'.
- A separate *Hazard Level Assessment* sheet is to be used for **each** chemical.
- The *Summary Sheet* lists the chemicals which have been assessed using the CHAP, and provides a comparison of the overall hazard levels for all of the chemicals assessed.

#### Limitations:

The CHAP tool has the following limitations:

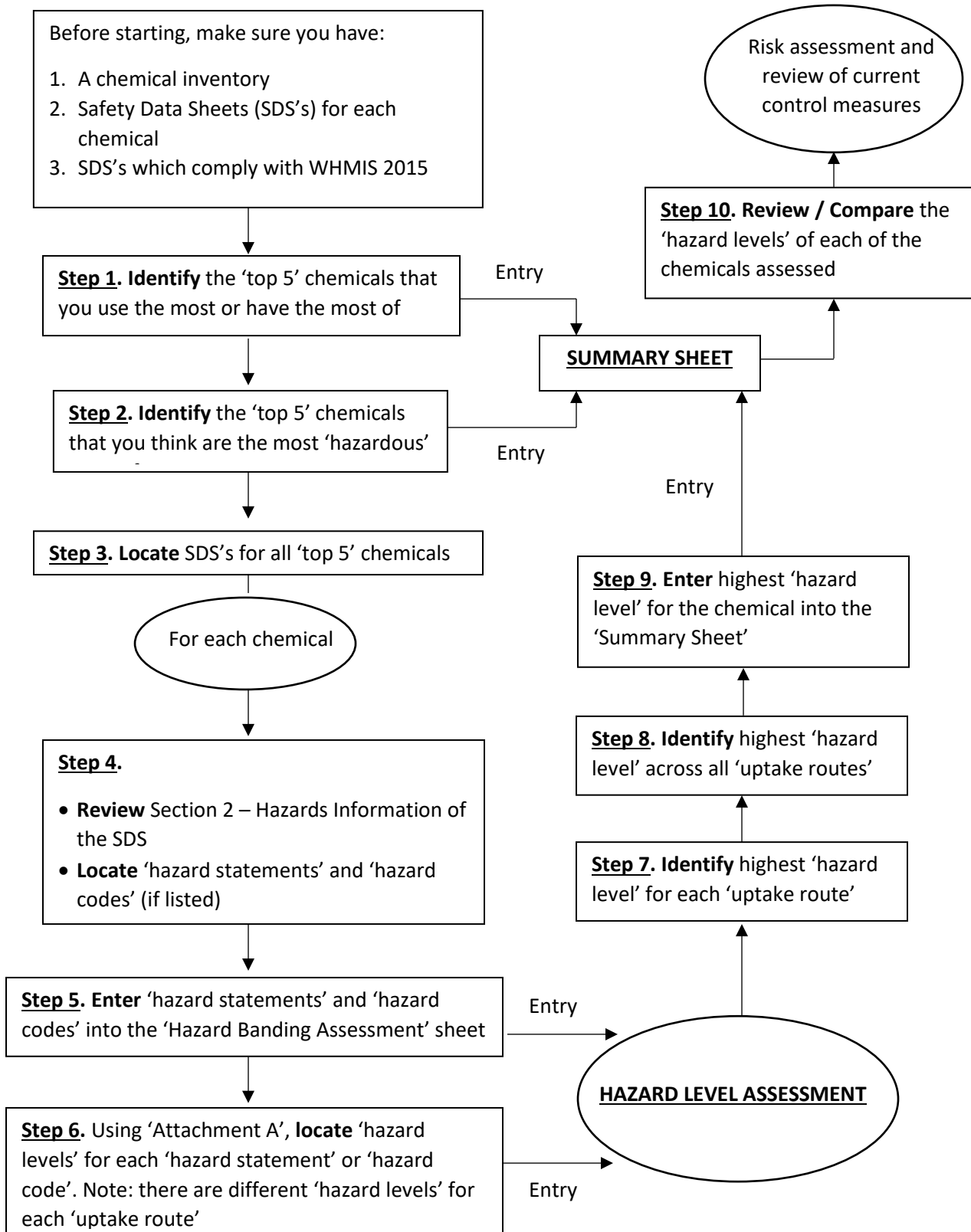
- The 'hazard level' assessment is focused on 'health' hazards. As such, 'safety' hazards, such as flammability, are not comprehensively assessed. Therefore, the CHAP hazard level assessment should be recognized as being primarily for 'health' hazards and not for a broader range of 'safety' hazards.
- Some chemicals may not be rated used the Globally Harmonized System (GHS) for chemicals, which is the basis for WHMIS 2015, even though these chemicals may be hazardous. For example, a product may have an Occupational Exposure Limit (OEL), but may not have any 'hazard statements' or 'hazard codes' listed in Section 2 of the Safety Data Sheet. If a chemical has an OEL (which will be described in the Safety Data Sheet in Section 8 'Exposure Controls/Personal Protection'), control measures should be implemented to ensure that worker exposures are maintained to be below the OEL.
- The CHAP Tool provides an initial screening assessment of health hazards related to chemicals. It therefore provides important information for use in a more comprehensive chemical risk assessment.

Contact: If you have questions about using this CHAP tool, please contact:

Dr. Thomas Tenkate, Ryerson University

[thomas.tenkate@ryerson.ca](mailto:thomas.tenkate@ryerson.ca)

**Chemical Hazard Assessment and Prioritization (CHAP)  
Assessment Flow Chart**



**“Setting Priorities”**  
**Chemical Hazard Assessment and Prioritization (CHAP)**

**Summary Sheet**

**Top 5 Chemicals – By Quantity Used**

Chemical / Product Name	Hazard Level*
1. <i>Example Product (refer to Hazard Banding Assessment Example on next page)</i>	C
1.	
2.	
3.	
4.	
5.	

**Top 5 Chemicals – By Perceived Hazard**

Chemical / Product Name	Hazard Band*
6.	
7.	
8.	
9.	
10.	

**\*Notes:**

1. Hazard Levels:
- A = Low Hazard
  - B = Moderate Hazard
  - C = High Hazard
  - D = Very High Hazard
  - E = Extremely High Hazard
  - n.a = Not Applicable

2. A separate Hazard Level is determined for each chemical using the attached *Hazard Level Assessment* sheet.

# “Setting Priorities”

## Chemical Hazard Assessment and Prioritization (CHAP)

From Attachment A if H codes provided, or Attachment B if only H statements

### Hazard Level Assessment – Example

Chemical: Example Product

Assessor: JS Date: Feb 12, 2019

Hazard (H) Statement (Please list from Section 2 of Safety Data Sheet)	Hazard (H) Code (From Section 2 of SDS)	Hazard Level (letter code A to E) (Refer to Attachment A or Attachment B)			
		Eye Damage	Inhalation	Local Skin Damage	Skin uptake, systemic
<i>Extremely flammable aerosol</i>	<i>H2xx</i>	<i>B</i>			
<i>Contains gas under pressure, may explode if heated</i>	<i>H2xx</i>	<i>B</i>			
<i>Toxic if swallowed</i>	<i>H301</i>	<i>B</i>	<i>C</i>	<i>n.a.</i>	<i>C</i>
<i>May be fatal if swallowed and enters airways</i>	<i>H304</i>	<i>B</i>	<i>A</i>	<i>n.a.</i>	<i>n.a.</i>
<i>Causes skin irritation</i>	<i>H315</i>	<i>C</i>	<i>B</i>	<i>B</i>	<i>n.a.</i>
<i>Causes serious eye irritation</i>	<i>H319</i>	<i>C</i>	<i>B</i>	<i>A</i>	<i>n.a.</i>
<i>May cause drowsiness or dizziness</i>	<i>H336</i>	<i>B</i>	<i>B</i>	<i>n.a.</i>	<i>n.a.</i>
<b>Overall (Highest hazard level [from A to E] for each ‘Uptake Route’)</b>		<b>C</b>	<b>C</b>	<b>A</b>	<b>C</b>

Note: these are physio-chemical hazards, so their H code = H2xx

‘Highest’ hazard level per ‘uptake route’

Highest Hazard Level (from A to E) For all ‘Uptake Routes’ = **C** → Transfer to ‘Summary Sheet’

**Example:** from section 2 (Hazards Identification) of the product’s Safety Data Sheet:  
 Hazard Statements: *Extremely flammable aerosol. Contains gas under pressure; may explode if heated. Toxic if swallowed. May be fatal if swallowed and enters airway, Causes skin irritation. Causes serious eye irritation. May cause drowsiness or dizziness.*

Note: H Codes were not listed in the Safety Data Sheet for this product, but can be determined from Attachment B

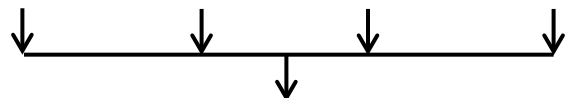
**“Setting Priorities”**  
**Chemical Hazard Assessment and Prioritization (CHAP)**

**Note:** Print one copy of this page for each chemical

**Hazard Level Assessment**

**Chemical:** \_\_\_\_\_ **Assessor:** \_\_\_\_\_ **Date:** \_\_\_\_\_

Hazard (H) Statement (Please list from Section 2 of Safety Data Sheet)	Hazard (H) Code (From Section 2 of SDS)	Hazard Level (letter code A to E) (Refer to Attachment A or Attachment B)			
		Eye Damage	Inhalation	Local Skin Damage	Skin uptake, systemic
<b>Overall</b> (Highest hazard level [from A to E] for <b>each</b> ‘Uptake Route’)					



Highest Hazard Level (from A to E) For **all** ‘Uptake Routes’ =  → Transfer to ‘Summary Sheet’



**“Setting Priorities”**  
**Chemical Hazard Assessment and Prioritization (CHAP)**

Source: Arnone et al. *Regulatory Toxicology and Pharmacology* 2015; 73: 287-295

**Attachment A**  
**Hazard Statements and Hazard Levels – listed numerically by H Code<sup>#</sup>**

Hazard Statements		Hazard Level (letter code A to E)			
H Code	H Statement	Eye Damage	Inhalation	Local Skin Damage	Skin uptake, systemic
H2xx*	Physio-chemical hazards*	B		n.a.	
H300	Fatal if swallowed	B	D <sup>a</sup> (E) <sup>c</sup>		D <sup>b</sup> (E) <sup>c</sup>
H301	Toxic if swallowed	B	C <sup>a</sup>	n.a.	C <sup>b</sup>
H302	Harmful if swallowed	B	B <sup>a</sup>	n.a.	B <sup>b</sup>
H303	May be harmful if swallowed	B	A <sup>a</sup>	n.a.	A <sup>b</sup>
H304	May be fatal if swallowed and enters airways	B	A	n.a.	n.a.
H305	May be harmful if swallowed and enters airways	B	A	n.a.	n.a.
H310	Fatal if contact with skin	B	n.a.	n.a.	D (E) <sup>c</sup>
H311	Toxic in contact with skin	B	n.a.	n.a.	C
H312	Harmful if contact with skin	B	n.a.	n.a.	B
H313	May be harmful in contact with skin	B	n.a.	n.a.	A
H314	Causes severe skin burns and eye damage	D	D	D	n.a.
H315	Causes skin irritation	C	B	B	n.a.
H316	Causes mild skin irritation	C	A	A	n.a.
H317	May cause an allergic skin reaction	B	C	D	D
H318	Causes serious eye damage	D	C	B	n.a.
H319	Causes serious eye irritation	C	B	A	n.a.
H320	Causes eye irritation	C	B	A	n.a.
H330	Fatal if inhaled	B	D (E) <sup>c</sup>	n.a.	n.a.
H331	Toxic if inhaled	B	C	n.a.	n.a.
H332	Harmful if inhaled	B	B	n.a.	n.a.
H333	May be harmful if inhaled	B	A	n.a.	n.a.
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled	B	D	n.a.	C
H335	May cause respiratory irritation	C	B	A	n.a.
H336	May cause drowsiness or dizziness	B	B	n.a.	n.a.
H340	May cause genetic defects	E	E	E	E
H341	Suspected of causing genetic defects	B	D	D	D
H350	May cause cancer	E	E	E	E
H350i	May cause cancer by inhalation	B	E	n.a.	n.a.
H351	Suspected of causing cancer	B	D	D	D
H360D H360F	May damage the unborn child / May damage fertility	B	D	n.a.	D
H361d / H361f	Suspected of damaging the unborn child / Suspected of damaging fertility	B	C	n.a.	C
H362	May cause harm to breast-fed children	B	C	n.a.	C
H370	Causes damage to organs	B	C	n.a.	C
H371	May cause damage to organs	B	B	n.a.	B
H372	Causes damage to organs through prolonged or repeated exposure	B	D	n.a.	D
H373	May cause damage to organs through prolonged or repeated exposure	B	C	n.a.	C
H4xx*	Environmental hazards*	B		n.a.	

<sup>a</sup> Only applies if no H statements exist for the inhalation exposure (H330–H333)

<sup>b</sup> Only applies if no H statements exist for the dermal exposure (H310–H313)

<sup>c</sup> Hazard band E only for acute tox. Cat. 1 substances, if the SDS is available

<sup>d</sup> Control banding outputs should include warnings about additional physio-chemical hazards.

\* All H codes/H statements, with H codes in the H200's and H400's have the same Hazard Band ratings

**Setting Priorities**  
**Chemical Hazard Assessment and Prioritization (CHAP)**

Source: Arnone et al. *Regulatory Toxicology and Pharmacology* 2015; 73: 287-295

**Attachment B**

**Hazard Statements and Hazard Levels – listed alphabetically by H Statement**

Hazard Statements		Hazard Level (letter code A to E)			
H Statement	H Code	Eye Damage	Inhalation	Local Skin Damage	Skin uptake, systemic
Causes damage to organs	H370	B	C	n.a.	C
Causes damage to organs through prolonged or repeated exposure	H372	B	D	n.a.	D
Causes eye irritation	H320	C	B	A	n.a.
Causes mild skin irritation	H316	C	A	A	n.a.
Causes serious eye damage	H318	D	C	B	n.a.
Causes serious eye irritation	H319	C	B	A	n.a.
Causes severe skin burns and eye damage	H314	D	D	D	n.a.
Causes skin irritation	H315	C	B	B	n.a.
Environmental hazards*	H4xx*	B		n.a.	
Fatal if contact with skin	H310	B	n.a.	n.a.	D (E) <sup>c</sup>
Fatal if inhaled	H330	B	D (E) <sup>c</sup>	n.a.	n.a.
Fatal if swallowed	H300	B	D <sup>a</sup> (E) <sup>c</sup>		D <sup>b</sup> (E) <sup>c</sup>
Harmful if contact with skin	H312	B	n.a.	n.a.	B
Harmful if inhaled	H332	B	B	n.a.	n.a.
Harmful if swallowed	H302	B	B <sup>a</sup>	n.a.	B <sup>b</sup>
May be fatal if swallowed and enters airways	H304	B	A	n.a.	n.a.
May be harmful if inhaled	H333	B	A	n.a.	n.a.
May be harmful if swallowed	H303	B	A <sup>a</sup>	n.a.	A <sup>b</sup>
May be harmful if swallowed and enters airways	H305	B	A	n.a.	n.a.
May be harmful in contact with skin	H313	B	n.a.	n.a.	A
May cause allergy or asthma symptoms or breathing difficulties if inhaled	H334	B	D	n.a.	C
May cause an allergic skin reaction	H317	B	C	D	D
May cause cancer	H350	E	E	E	E
May cause cancer by inhalation	H350i	B	E	n.a.	n.a.
May cause damage to organs	H371	B	B	n.a.	B
May cause damage to organs through prolonged or repeated exposure	H373	B	C	n.a.	C
May cause drowsiness or dizziness	H336	B	B	n.a.	n.a.
May cause genetic defects	H340	E	E	E	E
May cause harm to breast-fed children	H362	B	C	n.a.	C
May cause respiratory irritation	H335	C	B	A	n.a.
May damage the unborn child / May damage fertility	H360D H360F	B	D	n.a.	D
Physio-chemical hazards*	H2xx*	B		n.a. <sup>d</sup>	
Suspected of causing cancer	H351	B	D	D	D
Suspected of causing genetic defects	H341	B	D	D	D
Suspected of damaging the unborn child / Suspected of damaging fertility	H361d / H361f	B	C	n.a.	C
Toxic if inhaled	H331	B	C	n.a.	n.a.
Toxic if swallowed	H301	B	C <sup>a</sup>	n.a.	C <sup>b</sup>
Toxic in contact with skin	H311	B	n.a.	n.a.	C

<sup>a</sup> Only applies if no H statements exist for the inhalation exposure (H330–H333)

<sup>b</sup> Only applies if no H statements exist for the dermal exposure (H310–H313)

<sup>c</sup> Hazard band E only for acute tox. Cat. 1 substances, if the SDS is available

<sup>d</sup> Control banding outputs should include warnings about additional physio-chemical hazards

\* All H codes/H statements, with H codes in the H200's and H400's have the same Hazard Band ratings