Hazardous to the Aquatic Environment Harmonization Between GHS and TDG Criteria

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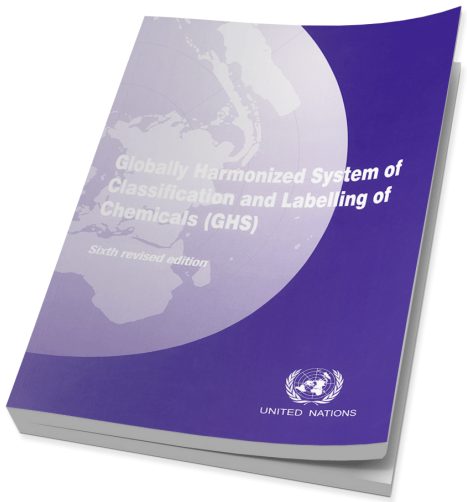
Comparison of Hazardous to the Aquatic Environment Criteria

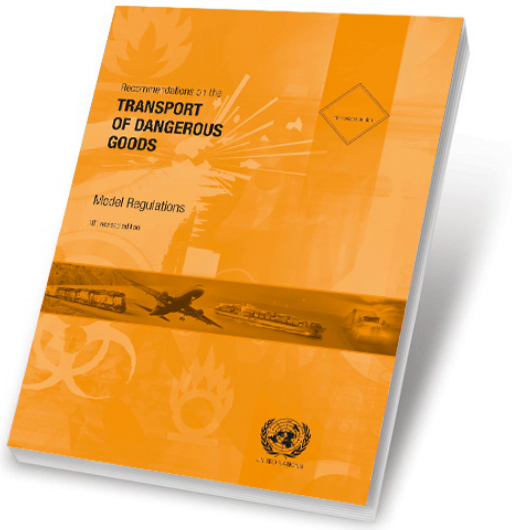
GHS

- 6th revised edition
- Chapter 4.1 Hazardous to the Aquatic Environment



TDG

- 19th revised edition
- Chapter 2.9 Class 9 – Miscellaneous Dangerous Substances and Articles, Including Environmentally Hazardous Substances



GHS Chapter 4.1 Hazardous to the Aquatic Environment

GHS paragraph: 4.1.1.7.3

The harmonized scheme is considered suitable for use for:

- **Packaged goods** in both supply & use
- **Multimodal transport** schemes
  - Elements of it may be used for **bulk land transport**
  - **Bulk marine** transport under MARPOL 73/78 Annex II insofar as this uses aquatic toxicity

Hazardous to the Aquatic Environment

GHS

- Classification criteria developed for:
  - Three acute categories, and
  - Four chronic categories (i.e. 3 core chronic categories)
  - The acute and chronic categories are applied independently
- The basic elements used for classification are:
  - Acute aquatic toxicity
  - Chronic aquatic toxicity
  - Potential for actual bioaccumulation
  - Degradation for organic chemicals

TDG

- Classification criteria developed for:
  - One acute categories, and
  - Two chronic categories
  - Substances shall be classified if they satisfy the criteria for Acute 1, and/or Chronic 1 or Chronic 2
- The basic elements used for classification are:
  - Acute aquatic toxicity
  - Chronic aquatic toxicity
  - Potential for actual bioaccumulation
  - Degradation for organic chemicals

Special Considerations

GHS

The classification scheme is intended to apply for all substances and mixtures, however, for some substances, e.g. metals and poorly soluble substances special guidance is necessary.

- Annex 9 – Guidance on Hazards to the Aquatic Environment
- Annex 10 – Guidance on Transformation/Dissolution of Metals and Metal Compounds in Aqueous Media

The annexes cover data interpretation and application of the criteria for special substances.

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While the following classification procedure is intended to apply to all substances and mixtures, it is recognized that in some cases, e.g. metals or poorly soluble inorganic compounds, special guidance will be necessary[2].

[2] *This can be found in Annex 10 of the GHS.*

Abiotic degradation such as hydrolysis, primary degradation, both abiotic and biotic, degradation in non-aquatic media and proven rapid degradation in the environment may all be considered in defining rapid degradability[3].

[3] *Special guidance on data interpretation is provided in Chapter 4.1 and Annex 9 of the GHS*

Definitions

GHS

- ✓Acute aquatic toxicity
- ✓Short-term (acute) hazard
- ✓Chronic aquatic toxicity
- ✓Long-term (chronic) hazard
- ✓NOEC (No Observed Effect Concentration)
- ✓Bioaccumulation
- ✓Degradation

TDG

- ✓Acute aquatic toxicity
- ✓Short-term (acute) hazard
- ✓Chronic aquatic toxicity
- ✓Long-term hazard
- ✓NOEC (No Observed Effect Concentration)
- ✓Bioaccumulation
- ✓Degradation

4.1 Hazardous to the Aquatic Environment

Classification Criteria for Substances

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Acute Classification Criteria

GHS
Table 4.1.1

(a) Short-term (acute) aquatic hazard

Category: Acute 1 (note 2)	
96 hr LC_{50} (for fish)	≤1 mg/L and/or
48 hr EC_{50} (for crustacea)	≤1 mg/L and/or
72 or 96hr ErC_{50} (for algae or other aquatic plants)	≤1 mg/L (note 3)
Category Acute 1 may be subdivided for some regulatory systems to include a lower band at $L(E)C_{50}$ ≤ 0.1 mg/L	
Category: Acute 2	
96 hr LC_{50} (for fish)	>1 - ≤10 mg/L and/or
48 hr EC_{50} (for crustacea)	>1 - ≤10 mg/L and/or
72 or 96hr ErC_{50} (for algae or other aquatic plants)	>1 - ≤10 mg/L (note 3)
Category: Acute 3	
96 hr LC_{50} (for fish)	>10 - ≤100 mg/L and/or
48 hr EC_{50} (for crustacea)	>10 - ≤100 mg/L and/or
72 or 96hr ErC_{50} (for algae or other aquatic plants)	>10 - ≤100 mg/L (note 3)
Some regulatory systems may extend this range beyond an $L(E)C_{50}$ of 100 mg/L through the introduction of another category.	

TDG
Table 2.9.1

(a) Short-term (acute) aquatic hazard

Category: Acute 1 (note 2)	
96 hr LC_{50} (for fish)	≤1 mg/L and/or
48 hr EC_{50} (for crustacea)	≤1 mg/L and/or
72 or 96hr ErC_{50} (for algae or other aquatic plants)	≤1 mg/L (note 3)

Note 2: When classifying substances as Acute 1 and/or Chronic 1 it is necessary at the same time to indicate an appropriate M factor to apply the summation method

Note 3: If the algal ErC_{50} falls more than 100 times below the next most sensitive species and results in classification solely on this effect consideration should be give if this is representative of toxicity to aquatic plans. Where it can be shown that this is not the case, professional judgment should be used in deciding if classification should be applied.

Chronic Classification Criteria

GHS
Table 4.1.1

(b) Long-term (chronic) aquatic hazard

(i) Non-rapidly degradable substances (note 4) for which there are adequate chronic toxicity data available

Category Chronic 1: (*Note 2*)	
Chronic NOEC or EC_x (for fish)	≤ 0.1 mg/l and/or
Chronic NOEC or EC_x (for crustacea)	≤ 0.1 mg/l and/or
Chronic NOEC or EC_x (for algae or other aquatic plants)	≤ 0.1 mg/l
Category Chronic 2:	
Chronic NOEC or EC_x (for fish)	≤ 1 mg/l and/or
Chronic NOEC or EC_x (for crustacea)	≤ 1 mg/l and/or
Chronic NOEC or EC_x (for algae or other aquatic plants)	≤ 1 mg/l

TDG
Table 2.9.1

(b) Long-term (chronic) aquatic hazard

(i) Non-rapidly degradable substances (note 4) for which there are adequate chronic toxicity data available

Category Chronic 1: (*Note 2*)	
Chronic NOEC or EC_x (for fish)	≤ 0.1 mg/l and/or
Chronic NOEC or EC_x (for crustacea)	≤ 0.1 mg/l and/or
Chronic NOEC or EC_x (for algae or other aquatic plants)	≤ 0.1 mg/l
Category Chronic 2:	
Chronic NOEC or EC_x (for fish)	≤ 1 mg/l and/or
Chronic NOEC or EC_x (for crustacea)	≤ 1 mg/l and/or
Chronic NOEC or EC_x (for algae or other aquatic plants)	≤ 1 mg/l

Note 2: When classifying substances as Acute 1 and/or Chronic 1 it is necessary at the same time to indicate an appropriate M factor to apply the summation method.

Note 4: Lack of degradability is based on either a lack of ready biodegradability or other evidence of lack rapid degradation. When no useful data on degradability are available, either experimentally determined or estimated data, the substance should be regarded as not rapidly degradable

Chronic Classification Criteria

GHS
Table 4.1.1

(b) Long-term (chronic) aquatic hazard

(ii) Rapidly degradable substances for which there are adequate chronic toxicity data available

Category Chronic 1: (*Note 2*)	
Chronic NOEC or EC_x (for fish)	≤ 0.01 mg/l and/or
Chronic NOEC or EC_x (for crustacea)	≤ 0.01 mg/l and/or
Chronic NOEC or EC_x (for algae or other aquatic plants)	≤ 0.01 mg/l
Category Chronic 2:	
Chronic NOEC or EC_x (for fish)	≤ 0.1 mg/l and/or
Chronic NOEC or EC_x (for crustacea)	≤ 0.1 mg/l and/or
Chronic NOEC or EC_x (for algae or other aquatic plants)	≤ 0.1 mg/l
Category Chronic 3:	
Chronic NOEC or EC_x (for fish)	≤ 1 mg/l and/or
Chronic NOEC or EC_x (for crustacea)	≤ 1 mg/l and/or
Chronic NOEC or EC_x (for algae or other aquatic plants)	≤ 1 mg/l

TDG
Table 2.9.1

(b) Long-term (chronic) aquatic hazard

(ii) Rapidly degradable substances for which there are adequate chronic toxicity data available

Category Chronic 1: (*Note 2*)	
Chronic NOEC or EC_x (for fish)	≤ 0.01 mg/l and/or
Chronic NOEC or EC_x (for crustacea)	≤ 0.01 mg/l and/or
Chronic NOEC or EC_x (for algae or other aquatic plants)	≤ 0.01 mg/l
Category Chronic 2:	
Chronic NOEC or EC_x (for fish)	≤ 0.1 mg/l and/or
Chronic NOEC or EC_x (for crustacea)	≤ 0.1 mg/l and/or
Chronic NOEC or EC_x (for algae or other aquatic plants)	≤ 0.1 mg/l

Note 2: When classifying substances as Acute 1 and/or Chronic 1 it is necessary at the same time to indicate an appropriate M factor to apply the summation method.

Chronic Classification Criteria

GHS
Table 4.1.1

(b) Long-term (chronic) aquatic hazard
(iii) Substances for which adequate chronic toxicity data are not available

Category Chronic 1: (note 2)

96 hr LC_{50} (for fish)	≤ 1 mg/l and/or
48 hr EC_{50} (for crustacea)	≤ 1 mg/l and/or
72 or 96hr ErC_{50} (for algae or other aquatic plants)	≤ 1 mg/l *(Note 3)*

and the substance is not rapidly degradable and/or the experimentally determined BCF is ≥ 500 (or, if absent, the log K_{ow} ≥ 4). *(Notes 4 and 5)*

Category Chronic 2:

96 hr LC_{50} (for fish)	> 1 but ≤ 10 mg/l and/or
48 hr EC_{50} (for crustacea)	> 1 but ≤ 10 mg/l and/or
72 or 96hr ErC_{50} (for algae or other aquatic plants)	> 1 but ≤ 10 mg/l *(Note 3)*

and the substance is not rapidly degradable and/or the experimentally determined BCF is ≥ 500 (or, if absent, the log K_{ow} ≥ 4). *(Notes 4 and 5)*

Category Chronic 3:

96 hr LC_{50} (for fish)	> 10 but ≤ 100 mg/l and/or
48 hr EC_{50} (for crustacea)	> 10 but ≤ 100 mg/l and/or
72 or 96hr ErC_{50} (for algae or other aquatic plants)	> 10 but ≤ 100 mg/l *(Note 3)*

and the substance is not rapidly degradable and/or the experimentally determined BCF is ≥ 500) (or, if absent, the log K_{ow} ≥ 4). *(Notes 4 and 5)*.

TDG
Table 2.9.1

(b) Long-term (chronic) aquatic hazard
(iii) Substances for which adequate chronic toxicity data are not available

Category Chronic 1: (see Note 2)

96 hr LC_{50} (for fish)	≤ 1 mg/l and/or
48 hr EC_{50} (for crustacea)	≤ 1 mg/l and/or
72 or 96hr ErC_{50} (for algae or other aquatic plants)	≤ 1 mg/l *(Note 3)*

and the substance is not rapidly degradable and/or the experimentally determined BCF is ≥ 500 (or, if absent, the log K_{ow} ≥ 4). *(Notes 4 and 5)*

Category Chronic 2:

96 hr LC_{50} (for fish)	> 1 but ≤ 10 mg/l and/or
48 hr EC_{50} (for crustacea)	> 1 but ≤ 10 mg/l and/or
72 or 96hr ErC_{50} (for algae or other aquatic plants)	> 1 but ≤ 10 mg/l *(Note 3)*

and the substance is not rapidly degradable and/or the experimentally determined BCF is ≥ 500 (or, if absent, the log K_{ow} ≥ 4). *(see Notes 4 and 5)*

Note 4: Lack of degradability is based on either a lack of ready biodegradability or other evidence of lack rapid degradation. When no useful data on degradability are available, either experimentally determined or estimated data, the substance should be regarded as not rapidly degradable

Note 5: Measured log K_{ow} values take precedence over estimated values and measured BCF values take precedence over log K_{ow} values.

Chronic Classification Criteria

GHS
Table 4.1.1

(c) "Safety net" classification

Category Chronic 4:

Poorly soluble substances for which no acute toxicity is recorded at levels up to the water solubility, and which are not rapidly degradable and have a log $K_{ow} \geq 4$, indicating a potential to bioaccumulate, will be classified in this category unless other scientific evidence exists showing classification to be unnecessary. Such evidence would include an experimentally determined BCF < 500, or a chronic toxicity NOECs > 1 mg/l, or evidence of rapid degradation in the environment.

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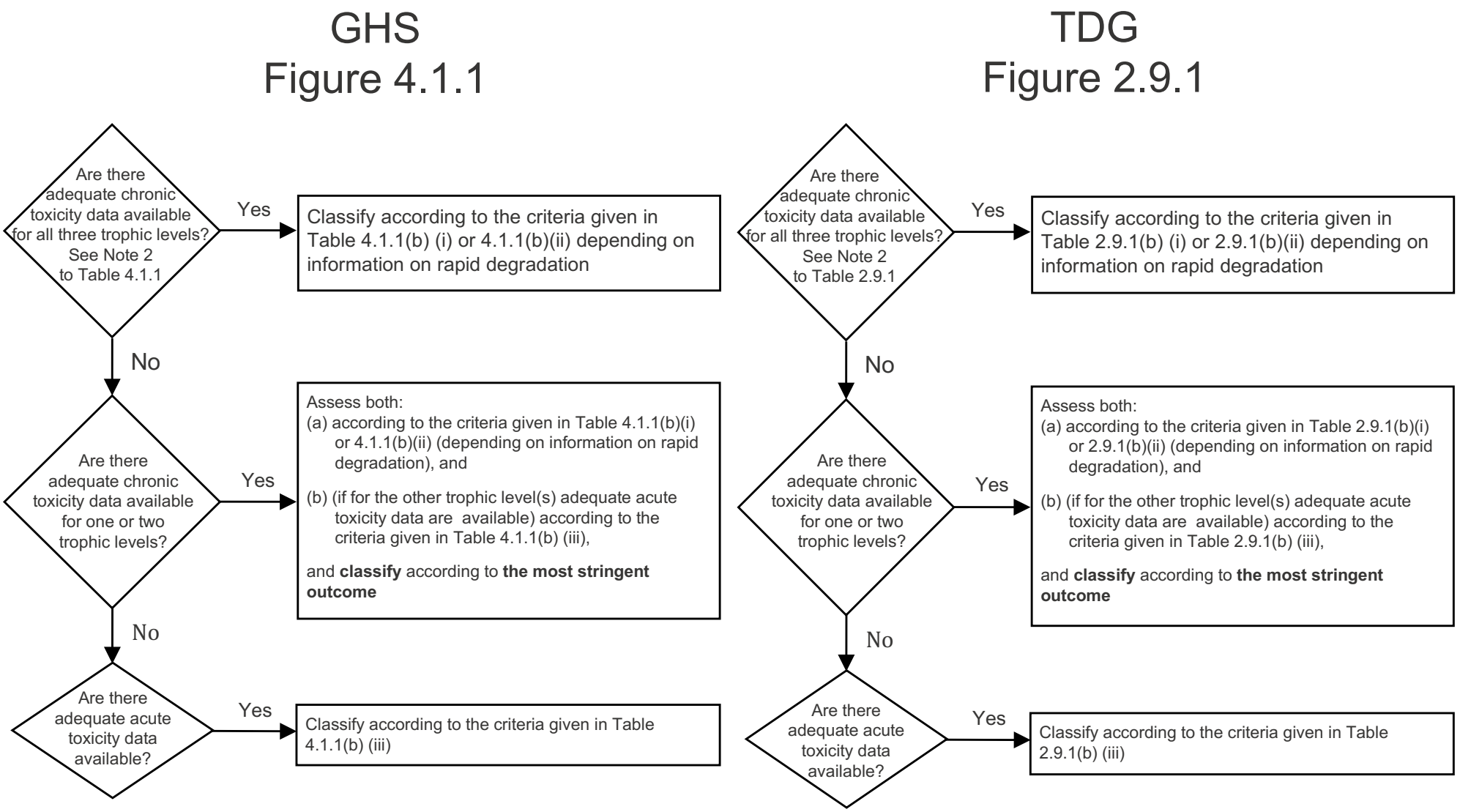
Table 2.9.1

Not adopted

Tiered Approach to Long Term Hazard Classification



4.1 Hazardous to the Aquatic Environment

Classification Criteria for Mixtures

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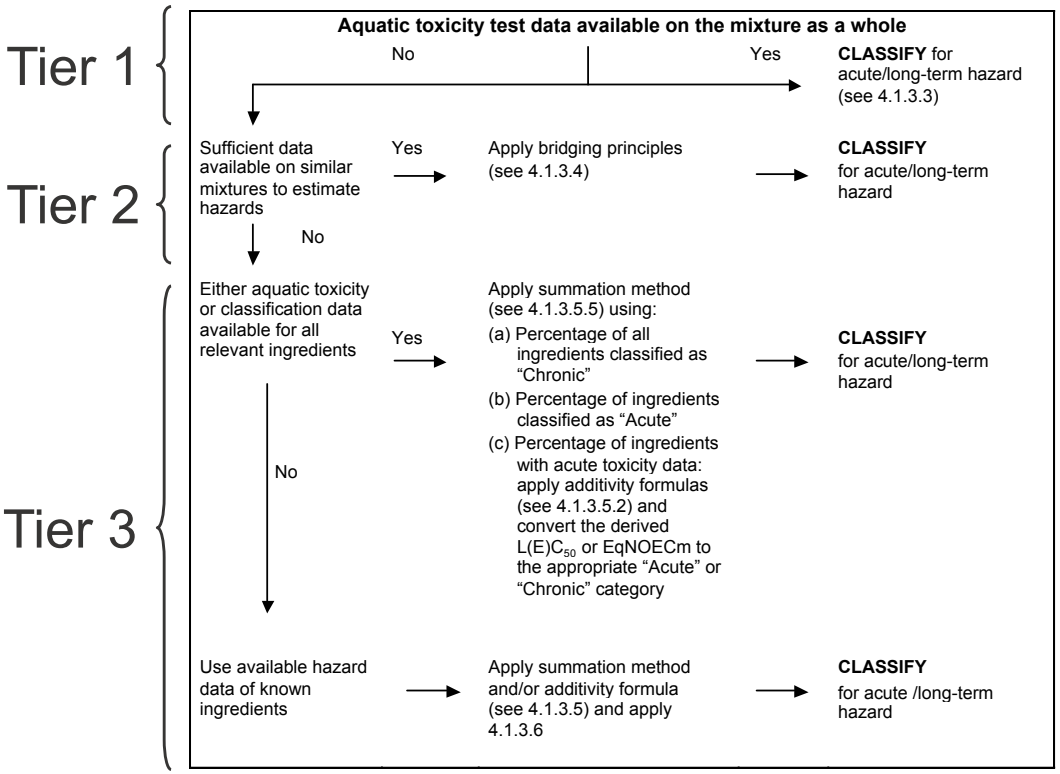
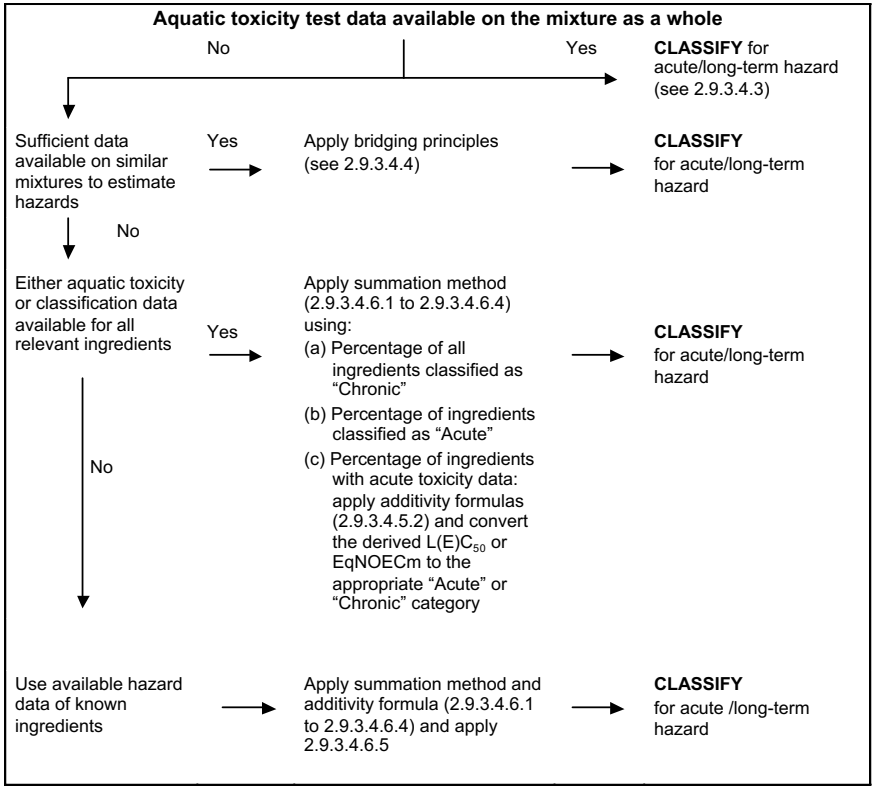
Tiered Approach to Classifying Mixtures

GHS
Figure 4.1.2



TDG
Figure 2.9.2



Tier 1 - Tested Mixtures Criteria

(GHS 4.1.3.3) *Classification of mixtures when toxicity data are available for the complete mixture*

"When the mixture as a whole has been texted to determine its aquatic toxicity, this information can be used for classifying the mixture according to the criteria that have been agreed for substances."

(TDG 2.9.3.4.3.1) *Classification of mixtures when toxicity data are available for the complete mixture*

"When the mixture as a whole has been texted to determine its aquatic toxicity, this information can be used for classifying the mixture according to the criteria that have been agreed for substances."

Tier 1 - Tested Mixtures Criteria

(GHS 4.1.3.3) *Classification of mixtures when toxicity data are available for the complete mixture*

- Short-term (acute) Hazard:
  - Use Table 4.1.1 (a) Short-term (acute) aquatic hazard
- Long-term (chronic) Hazard:
  - Use Table 4.1.1. (b) Long-term (chronic) aquatic hazard/Sub-part

    (b)(ii) Rapidly degradable substances
    - IF available information allows for the conclusion that all relevant ingredients are rapidly degradable, otherwise

    (b)(i) Non-rapidly degradable substances
  - Use Table 4.1.1(c) “Safety net”

(TDG 2.9.3.4.3.1) *Classification of mixtures when toxicity data are available for the complete mixture*

- Short-term (acute) Hazard:
  - Use Table 2.9.1 (a) Short-term (acute) aquatic hazard
- Long-term (chronic) Hazard:
  - Use Table 2.9.1. (b) Long-term (chronic) aquatic hazard/Sub-part

    (b)(ii) Rapidly degradable substances
    - IF available information allows for the conclusion that all relevant ingredients are rapidly degradable, otherwise

    (b)(i) Non-rapidly degradable substances

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Tier 2 - Bridging Principles

(GHS 4.1.3.4) *Classification of mixtures when toxicity data are not available for the complete mixture: bridging principles*

"Where the mixtures itself has not been tested to determine its aquatic environmental hazard, but there are sufficient data on both the individual ingredients and similar test mixtures to adequately characterize the hazards of the mixture, this data will be used in accordance with the following agreed bridging principles."

- Dilution
- Batching
- Concentration of mixtures which are classified with the most severe classification categories (Chronic 1 and Acute 1)
- Interpolation within one toxicity category
- Substantially similar mixtures

(TDG 2.9.3.4.4) *Classification of mixtures when toxicity data are not available for the complete mixture: bridging principles*

"Where the mixtures itself has not been tested to determine its aquatic environmental hazard, but there are sufficient data on the individual ingredients and similar test mixtures to adequately characterize the hazards of the mixture, this data will be used in accordance with the following agreed bridging principles."

- Dilution
- Batching
- Concentration of mixtures which are classified with the most severe classification categories (Chronic 1 and Acute 1)
- Interpolation within one toxicity category
- Substantially similar mixtures

Tier 3: Un-Tested Mixtures ”Relevant Ingredients”

(GHS 4.1.3.1)

“Relevant ingredients” of a mixture are those which are present in a concentration ≥ 0.1% (w/w) for ingredients classified as Acute and/or Chronic 1

AND

≥ 1% for other ingredients,

UNLESS

there is a presumption (e.g. in the case of highly toxic ingredients) that an ingredient present at < 0.1% can still be relevant for the classification

(TDG 2.9.3.4.1)

“Relevant ingredients” of a mixture are those which are present in a concentration ≥ 0.1% (mass) for ingredients classified as Acute and/or Chronic 1

AND

≥ 1% for other ingredients,

UNLESS

there is a presumption (e.g. in the case of highly toxic ingredients) that an ingredient present at < 0.1% can still be relevant for the classification

Tier 3: Un-Tested Mixtures Criteria

(GHS 4.1.3.5) *Classification of mixtures when toxicity data are available for all ingredients or only for some ingredients of the mixture*

4.1.3.5.2 **Additivity Formulas**

(a) Acute Aquatic Toxicity

$$\frac{\sum C_i}{L(E)C50_{mix}} = \sum_n \frac{C_i}{L(E)C_{50_i}}$$

(b) Chronic aquatic toxicity:

$$\frac{\sum C_i + \sum C_j}{EqNOEC_{mix}} = \sum_n \frac{C_i}{NOEC_i} + \sum_n \frac{C_j}{0.1 \times NOEC_j}$$

(TDG 2.9.3.4.5) *Classification of mixtures when toxicity data are available for all ingredients or only for some ingredients of the mixture*

2.9.3.4.5.2 **Additivity Formulas**

(a) Acute Aquatic Toxicity:

$$\frac{\sum C_i}{L(E)C50_{mix}} = \sum_n \frac{C_i}{L(E)C_{50_i}}$$

(b) Chronic Aquatic Toxicity:

$$\frac{\sum C_i + \sum C_j}{EqNOEC_{mix}} = \sum_n \frac{C_i}{NOEC_i} + \sum_n \frac{C_j}{0.1 \times NOEC_j}$$

Tier 3: Application of the Acute Additivity Formula

(GHS 4.1.3.5) *Classification of mixtures when toxicity data are available for all ingredients or only for some ingredients of the mixture*

4.1.3.5.2 Additivity Formulas

(a) **Acute Aquatic Toxicity**

$$\frac{\sum C_i}{L(E)C_{50_{mix}}} = \sum_n \frac{C_i}{L(E)C_{50_i}}$$

(TDG 2.9.3.4.5) *Classification of mixtures when toxicity data are available for all ingredients or only for some ingredients of the mixture*

2.9.3.4.5.2 Additivity Formulas

(a) **Acute Aquatic Toxicity:**

$$\frac{\sum C_i}{L(E)C_{50_{mix}}} = \sum_n \frac{C_i}{L(E)C_{50_i}}$$

where:

C_I	=	concentration of ingredient i (weight percentage)
$L(E)C_{50i}$	=	LC_{50} or EC_{50} for component I, in mg/L
η	=	number of ingredients, and i is running from 1 to n;
$L(E)C_m$	=	$L(E)\ C_{50}$ of the part of the mixture with test data

The calculated toxicity **may** be used to assign that portion of the mixture a short-term (acute) hazard category which is then subsequently used in applying the summation method;

The calculated toxicity **shall** be used to assign that portion of the mixture an acute hazard category which is then subsequently used in applying the summation method;

Tier 3: Application of the Chronic Additivity Formula

(GHS 4.1.3.5) *Classification of mixtures when toxicity data are available for all ingredients or only for some ingredients of the mixture*

4.1.3.5.2 Additivity Formulas

(b) **Chronic aquatic toxicity:**

$$\frac{\sum C_i + \sum C_j}{EqNOEC_{mix}} = \sum_n \frac{C_i}{NOEC_i} + \sum_n \frac{C_j}{0.1 \times NOEC_j}$$

(TDG 2.9.3.4.5) *Classification of mixtures when toxicity data are available for all ingredients or only for some ingredients of the mixture*

2.9.3.4.5.2 Additivity Formulas

(b) **Chronic Aquatic Toxicity:**

$$\frac{\sum C_i + \sum C_j}{EqNOEC_{mix}} = \sum_n \frac{C_i}{NOEC_i} + \sum_n \frac{C_j}{0.1 \times NOEC_j}$$

where:

Ci	= concentration of ingredient i (weight percentage) covering the rapidly degradable ingredients;
Cj	= concentration of ingredient j (weight percentage) covering the non-rapidly degradable ingredients;
NOECi	= NOEC (or other recognized measures for chronic toxicity) for ingredient i covering the rapidly degradable ingredients, in mg/l;
NOEC j	= NOEC (or other recognized measures for chronic toxicity) for ingredient j covering the non-rapidly degradable ingredients, in mg/l;
n	= number of ingredients, and i and j are running from 1 to n;
$EqNOEC_m$	= Equivalent NOEC of the part of the mixture with test data;

The calculated equivalent toxicity **may** be used to assign that portion of the mixture a long-term (chronic) hazard category, …, which is then subsequently used in applying the summation method;

The calculated equivalent toxicity **shall** be used to assign that portion of the mixture a long-term hazard category, …, which is then subsequently used in applying the summation method;

Application of the Additivity Formula

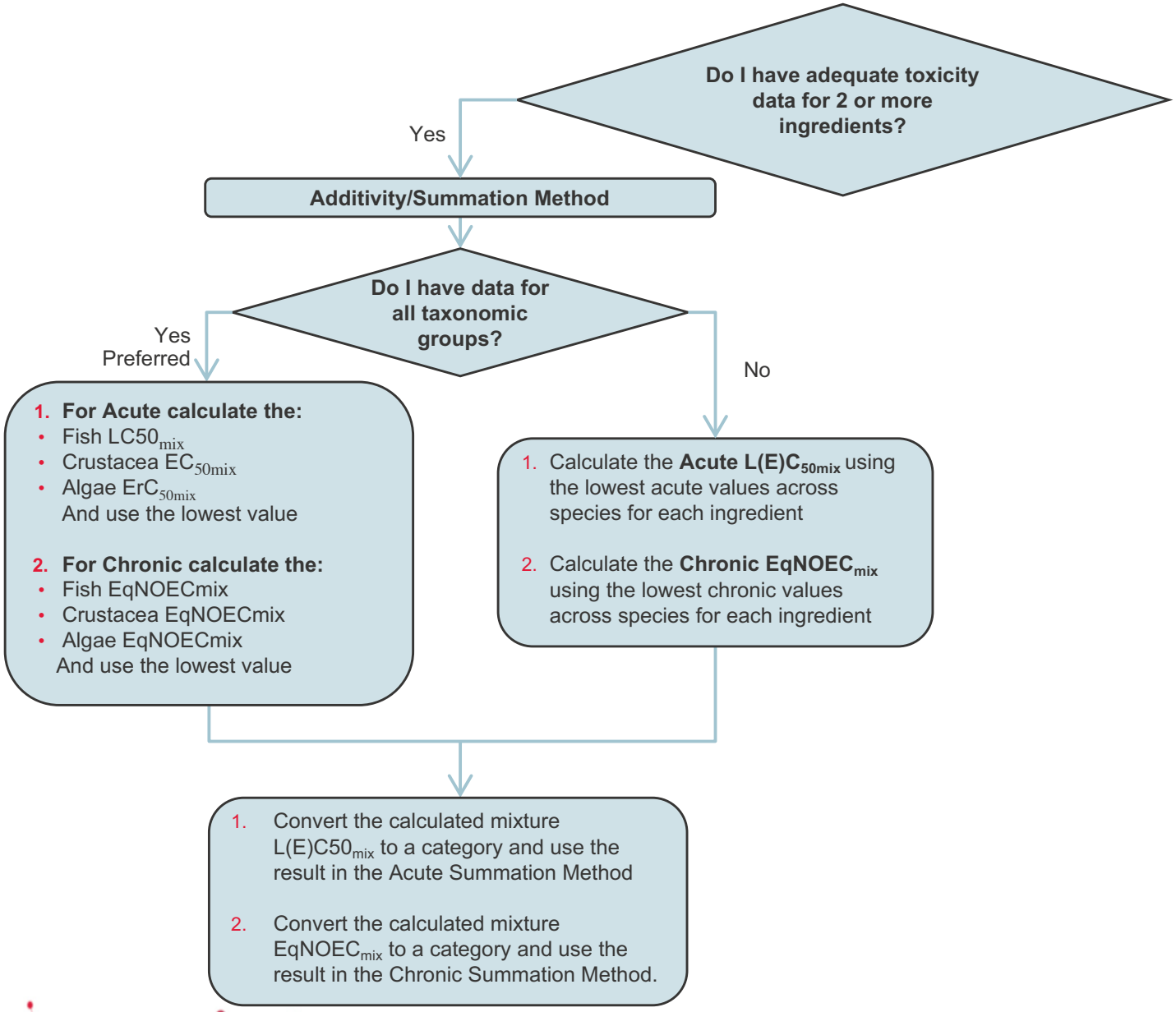
$$\frac{\sum C_i}{L(E)C_{50_{mix}}} = \sum_n \frac{C_i}{L(E)C_{50_i}} \qquad \frac{\sum C_i + \sum C_j}{EqNOEC_{mix}} = \sum_n \frac{C_i}{NOEC_i} + \sum_n \frac{C_j}{0.1 \times NOEC_j}$$

- It is preferable to calculate the toxicity of this part of the mixture using each ingredient toxicity values that relate to the same taxonomic group (i.e. fish, crustacean or algae) and then use the highest toxicity (lowest value) obtained (i.e. use the most sensitive of the three groups)
- However, when the toxicity data for each ingredient are not available in the same taxonomic group, select the higher toxicity (from the most sensitive test organism)

$$\frac{\sum C_i + \sum C_j}{EqNOEC_{mix}} = \sum_n \frac{C_i}{NOEC_i} + \sum_n \frac{C_j}{0.1 \times NOEC_j}$$

- The equivalent toxicity, $EqNOEC_m$, reflects the fact that non-rapidly degrading substances are classified one hazard category level more “severe” than rapidly degrading substances.
- The calculated equivalent toxicity, $EqNOEC_m$, may be used to assign that portion of the mixture a long-term hazard category, in accordance with the criteria for rapidly degradable substances (Table 4.1.1 (b)(ii)), which is then subsequently used in applying the summation method.

Which calculation method do I use for hazard classification?



Tier 3: Un-Tested Mixtures Criteria

(GHS 4.1.3.5) *Classification of mixtures when toxicity data are available for all ingredients or only for some ingredients of the mixture*

4.1.3.5.5 **Summation Method**

(a) Acute Aquatic Toxicity

Sum of components classified as:	Mixture is classified as
Acute 1 x M ≥ 25%	Acute 1
(M x 10 x Acute 1) +Acute 2 ≥ 25%	Acute 2
(M x 100 x Acute 1)+ (10 x Acute 2) + Acute 3 ≥ 25%	Acute 3

(b) Chronic aquatic toxicity:

Sum of components classified as:	Mixture is classified as
Chronic 1 x M ≥ 25%	Chronic 1
(M x 10 x Chronic 1)+Chronic 2 ≥ 25%	Chronic 2
(M x 100 x Chronic 1)+(10x Chronic 2)+Chronic 3 ≥ 25%	Chronic 3
Chronic 1 + Chronic 2 + Chronic 3 +Chronic 4 ≥ 25%	Chronic 4

(TDG 2.9.3.4.5) *Classification of mixtures when toxicity data are available for all ingredients or only for some ingredients of the mixture*

2.9.3.4.6 **Summation Method**

(a) Acute Aquatic Toxicity:

Sum of components classified as:	Mixture is classified as
Acute 1 x M ≥ 25%	Acute 1

(b) Chronic Aquatic Toxicity:

Sum of components classified as:	Mixture is classified as
Chronic 1 x M ≥ 25%	Chronic 1
(M x 10 x Chronic 1)+Chronic 2 ≥ 25%	Chronic 2

Determination of the M-Factor

Table 4.1.5 Multiplying factors for highly toxic ingredients of mixtures

Acute toxicity	M factor	Chronic toxicity	M factor	
$L(E)C_{50}$ value		NOEC value	NRD[a] ingredients	RD[b] ingredients
$0.1 < L(E)C_{50} \leq 1$	1	$0.01 < NOEC \leq 0.1$	1	-
$0.01 < L(E)C_{50} \leq 0.1$	10	$0.001 < NOEC \leq 0.01$	10	1
$0.001 < L(E)C_{50} \leq 0.01$	100	$0.0001 < NOEC \leq 0.001$	100	10
$0.0001 < L(E)C_{50} \leq 0.001$	1000	$0.00001 < NOEC \leq 0.0001$	1000	100
$0.00001 < L(E)C_{50} \leq 0.0001$	10000	$0.000001 < NOEC \leq 0.00001$	10000	1000
(continue in factor 10 intervals)		(continue in factor 10 intervals)		

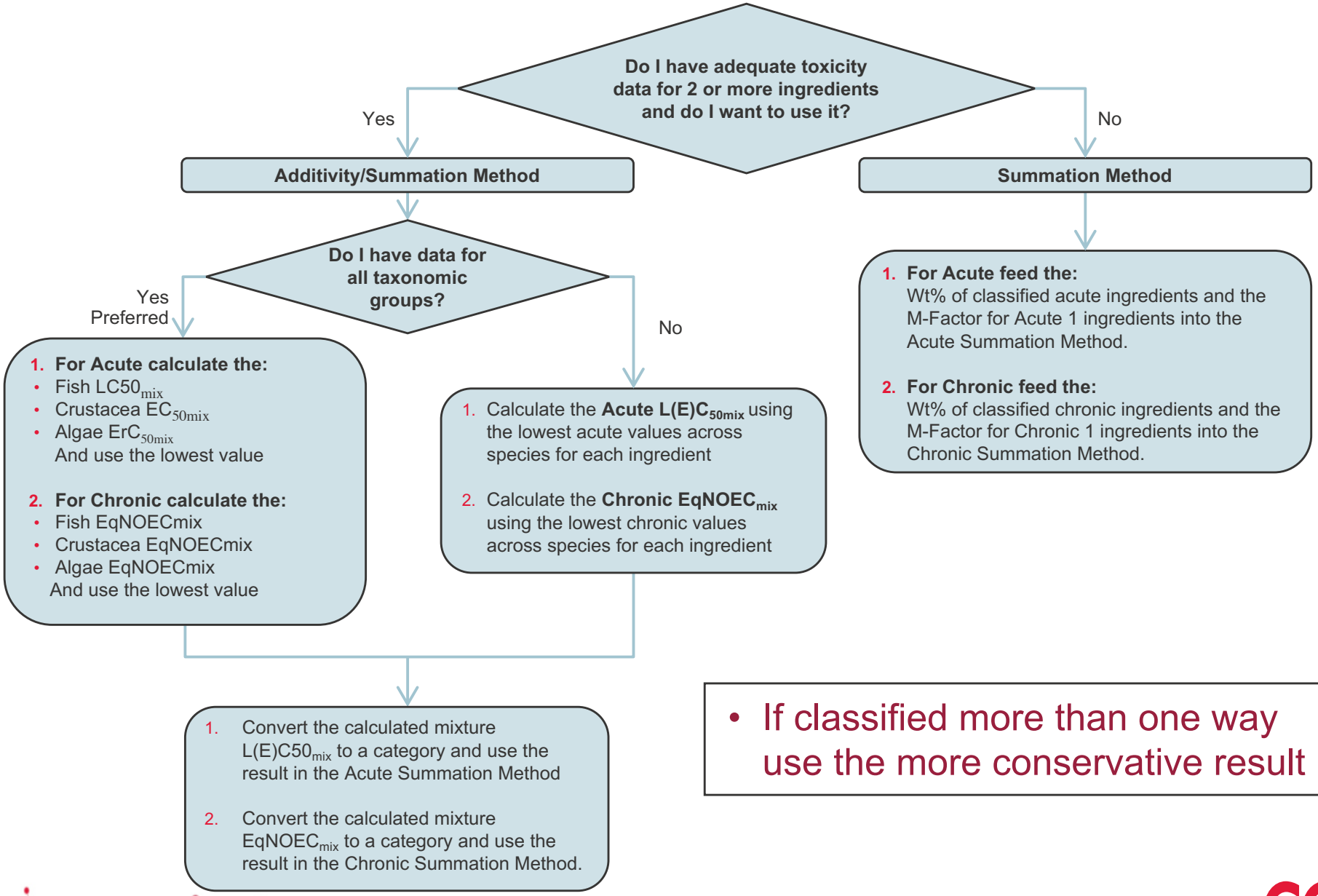
[a] *Non-rapidly degradable*
[b] *Rapidly degradable*

Table 2.9.5 Multiplying factors for highly toxic ingredients of mixtures

Acute toxicity	M factor	Chronic toxicity	M factor	
$L(E)C_{50}$ value		NOEC value	NRD[a] ingredients	RD[b] ingredients
$0.1 < L(E)C_{50} \leq 1$	1	$0.01 < NOEC \leq 0.1$	1	-
$0.01 < L(E)C_{50} \leq 0.1$	10	$0.001 < NOEC \leq 0.01$	10	1
$0.001 < L(E)C_{50} \leq 0.01$	100	$0.0001 < NOEC \leq 0.001$	100	10
$0.0001 < L(E)C_{50} \leq 0.001$	1000	$0.00001 < NOEC \leq 0.0001$	1000	100
$0.00001 < L(E)C_{50} \leq 0.0001$	10000	$0.000001 < NOEC \leq 0.00001$	10000	1000
(continue in factor 10 intervals)		(continue in factor 10 intervals)		

[a] *Non-rapidly degradable*
[b] *Rapidly degradable*

Which calculation method do I use for hazard classification?



- If classified more than one way use the more conservative result

Ingredients With Unknown Aquatic Toxicity

(GHS 4.1.3.6) *Classification of mixtures with ingredients without any useable information*

In the event that **no usable information** on acute and/or chronic aquatic toxicity is available for one or more relevant ingredients … **classify based on the known ingredients only**…. with the additional statement.

"x % of the mixture consists of ingredient(s) of unknown hazards to the aquatic environment"

Competent authority can decided if the statement is communicated on the label, SDS or both, or to leave the choice to the supplier.

(TDG 2.9.3.4.6.5.1) *Classification of mixtures with ingredients without any useable information*

In the event that **no usable information** on acute and/or chronic aquatic toxicity is available for one or more relevant ingredients … **classify based on the known ingredients only**…. with the additional statement.

"x percent of the mixture consists of ingredient(s) of unknown hazards to the aquatic environment"

Conclusion

The GHS and TDG classification criteria are harmonized….

However, as expected, the communication elements/processes associated with classification are different because of the different intended target audiences between a GHS implementation and the TDG

When Classified …

GHS

Harmonized Hazard Communication Elements

Classification		Labelling		
Hazard class	**Hazard category**	**Pictogram GHS**	**Signal word**	**Hazard statement**
Hazards to the aquatic environment Short-term (acute)	**Acute 1**		**Warning**	Very toxic to aquatic life
	Acute 2	*No pictogram*	*No signal word*	Toxic to aquatic life
	Acute 3	*No pictogram*	*No signal word*	Harmful to aquatic life

Classification		Labelling		
Hazard class	**Hazard category**	**Pictogram GHS**	**Signal word**	**Hazard statement**
Hazards to the aquatic environment Long-term (chronic)	**Chronic 1**		**Warning**	Very toxic to aquatic life with long lasting effects
	Chronic 2		*No signal word*	Toxic to aquatic life with long lasting effects
	Chronic 3	*No pictogram*	*No signal word*	Harmful to aquatic life with long lasting effects
	Chronic 4	*No pictogram*	*No signal word*	May cause long lasting harmful effects to aquatic life

TDG

- From a transport perspective if the substance or mixture satisfy the criteria for Acute 1 and/or Chronic 1 or Chronic 2 then for transport they are classified as: “environmentally hazardous substances (aquatic environment)”
- Application of the proper shipping names:
  - UN3077 Environmentally Hazardous Substance, Solid, N.O.S.
  - UN3082 Environmentally Hazardous Substance, Liquid, N.O.S.

  is for “environmentally hazardous substances (aquatic environment)” that do not meet the classification criteria of any other class or another substance within Class 9.

Additional TDG Considerations…

UN 3077 and 3082 may also be used for:

1. Wastes not otherwise subject to TDG Regulations but which are covered under the *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal* and
2. Substances designated to be environmentally hazardous substances by the competent authority of the country of origin, transit or destination which do not meet the criteria for an environmentally hazardous substance according to these Regulations or for any other hazard class

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