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Comité d'experts du transport des marchandises dangereuses et du Système général harmonisé de classification et d'étiquetage des produits chimiques

Sous-Comité d'experts du Système général harmonisé de classification et d'étiquetage des produits chimiques

Vingtième session
Genève, 7-9 décembre 2010
Point 4 a) de l'ordre du jour provisoire
Mise en œuvre du SGH − Questions y relatives

Propositions visant à résoudre les problèmes recensés dans le programme de travail du groupe de travail par correspondance chargé des questions pratiques de classification

Communication de l'expert des États-Unis d'Amérique au nom du groupe de travail informel par correspondance chargé des questions pratiques de classification[1]

Objet

1. Par le biais de ce document, le groupe de travail informel par correspondance chargé des questions pratique de classification voudrait formuler des recommandations devant permettre de préciser les critères de classification dans le SGH et donner des exemples concrets d'application des critères du SGH.

Historique

2. À sa dix-septième session, le Sous-Comité a approuvé le programme de travail que le groupe de travail informel par correspondance chargé des questions pratiques de classification devait entreprendre (voir le document INF.5 présenté à la dix-septième session). De nombreux points provenaient du document présenté par le groupe de travail

[1] Conformément au programme de travail du Sous-Comité pour 2009-2010, adopté par le Comité à sa quatrième session (voir ST/SG/AC.10/C.4/32, annexe II et ST/SG/AC.10/36, par. 14).

informel chargé de la mise en œuvre du SGH en décembre 2008 (voir ST/SG/AC.10/C.4/2008/22).

3. Le présent document est l'aboutissement du travail qui a débuté à la seizième session du Sous-Comité en décembre 2008 et s'est poursuivi au cours des deux dernières années. Pendant cette période de deux ans, le groupe de travail informel par correspondance a adopté la démarche qui consistait à élaborer des documents de réflexion, où étaient décrits en détail les points de son programme de travail et où étaient proposées des démarches de remplacement en vue de préciser le texte du SGH. Ces documents proposaient aussi des projets d'exemples concrets, illustrant l'application du principe d'extrapolation et des critères de danger pour l'environnement aquatique. Ces documents ont permis au groupe de travail informel de se pencher sur les avantages et les inconvénients des démarches de remplacement, s'agissant des corrections de forme et des exemples concrets. Les résultats de ces échanges de vues lui ont en outre permis d'atteindre un consensus sur les propositions de corrections de forme à apporter au texte du SGH et celles d'exemples concrets.

4. Les solutions que le groupe de travail par correspondance propose relèvent de trois catégories:

a) Corrections de forme du texte du SGH (voir annexe 1);

b) Exemples concrets démontrant l'application des principes d'extrapolation aux mélanges (voir annexe 2);

c) Exemples concrets démontrant l'application des critères de classification aux mélanges dangereux pour l'environnement aquatique (voir annexe 3).

Proposition

5. Le groupe de travail par correspondance prie le Sous-Comité d'approuver:

a) Les corrections de forme qu'il est recommandé d'apporter au texte du SGH. Ces corrections, une fois approuvées, seraient incorporées dans la prochaine édition révisée du SGH;

b) Les exemples concrets démontrant l'application des principes d'extrapolation du SGH aux mélanges et des critères de classification aux mélanges dangereux pour l'environnement aquatique. Ces exemples seraient ensuite proposés pour insertion dans le document de formation que l'Institut des Nations Unies pour la formation et la recherche (UNITAR) élabore actuellement.

6. Le présent document et ces recommandations sont présentés au Sous-Comité pour examen et approbation.

Annexe 1

Propositions d'amendements de forme à apporter au texte du SGH

Chapitre 1.3: Classification des substances et des mélanges dangereux

(*voir INF.24 (dix-neuvième session), annexe 1, point 1*)

1.3.2.3 Ajouter «1.3.2.3.1» avant le premier paragraphe («Les critères de classification…») et modifier comme suit le début de la deuxième phrase: «Pour la plupart des classes de danger, le processus recommandé…».

1.3.2.3.2 Ajouter un nouveau paragraphe, ainsi conçu:

«1.3.2.3.2 Dans la plupart des cas, s'agissant des classes de danger relatives à la mutagénicité pour les cellules germinales, à la cancérogénicité et à la toxicité pour la reproduction, on ne s'attend pas à disposer de données fiables pour les mélanges complets. Pour ces classes de danger, il convient donc de classer les mélanges sur la base des informations disponibles pour leurs divers composants, en employant les méthodes des seuils/limites de concentration, décrites dans chacun des chapitres. La classification peut être modifiée au cas par cas sur la base des résultats d'épreuve disponibles pour le mélange complet, dès lors que ces résultats sont irréfutables, comme décrit dans chacun des chapitres.».

Chapitre 3.1: Toxicité aiguë

(*voir INF.24 (dix-neuvième session), annexe 1, points 2 et 4*)

3.1.3.6.2.2 À la fin de la deuxième phrase, remplacer «toxicité inconnue» par «toxicité aiguë inconnue (par ingestion/contact cutané/inhalation)».

Ajouter, à la fin du texte existant, la phrase suivante:

«L'autorité compétente peut décider soit de préciser qu'une ou plusieurs mentions supplémentaires soient indiquées sur l'étiquette ou sur la FDS ou sur les deux, soit de laisser au fabricant/fournisseur le choix de l'emplacement de la mention.».

3.1.3.6.2.3 Insérer «pertinents» après «composants» (à deux reprises).

3.1.4 Insérer «3.1.4.1» avant le premier paragraphe («Des considérations générales et particulières…»).

3.1.4.2 Ajouter un nouveau paragraphe après le NOTA sous le tableau 3.1.3, libellé comme suit:

«3.1.4.2 Dans les mentions de danger pour la toxicité aiguë, les dangers sont différenciés selon la voie d'exposition. L'indication de la classification, s'agissant de la toxicité aiguë, doit aussi rendre compte de cette différenciation et faire la différence, par exemple, entre la Catégorie 1 de toxicité aiguë par ingestion, la Catégorie 1 de toxicité aiguë par contact cutané et la Catégorie 1 de toxicité aiguë par inhalation. Si une substance ou un mélange est classé comme toxique par plusieurs voies d'exposition, toutes

les classifications pertinentes devraient être communiquées sur la fiche des données de sécurité, comme indiqué à l'annexe 4, et les éléments de communication des dangers correspondants doivent figurer sur l'étiquette, comme prescrit au 3.1.3.2. Si la mention "x % du mélange consiste en composants de toxicité aiguë inconnue (par ingestion/contact cutané/inhalation)" est indiquée, comme prescrit au 3.1.3.6.2.2, il peut, en fonction de la voie d'exposition, aussi être fait la différence, par exemple, entre "x % du mélange consiste en composants de toxicité aiguë inconnue par ingestion" et "x % du mélange consiste en composants de toxicité aiguë inconnue par contact cutané".».

3.1.5.2 Modifier comme suit la note de bas de page 3 s'appliquant au diagramme de décision *(les modifications sont indiquées)*:

«Dans l'éventualité où un composant pour lequel on ne dispose d'aucune information valable est utilisé dans le mélange à une concentration ≥1%, on classe le mélange sur la base des seuls composants connus et avec la mention que x % du mélange consiste en composants de toxicité aiguë inconnue (par ingestion/contact cutané/inhalation). L'autorité compétente peut décider soit de préciser qu'une ou plusieurs mentions supplémentaires soient indiquées sur l'étiquette ou sur la FDS ou sur les deux, soit de laisser au fabricant/fournisseur le choix de l'emplacement de la mention.».

Annexe 4: Document guide sur l'élaboration de fiches de données de sécurité (FDS)

(*voir INF.24 (dix-neuvième session), annexe 1, point 2*)

A4.3.2.1.2 Modifier comme suit (*les modifications sont indiquées*):

«Si la substance ou le mélange est classé conformément aux parties 2, 3 ou 4 du SGH, la classification est habituellement communiquée en indiquant la classe et la catégorie appropriées de danger (par exemple, liquide inflammable, Catégorie 1). Toutefois, lorsque différentes classes de danger sont concernées et qu'une seule mention de danger est indiquée, l'indication de la classification doit rendre compte de cette différenciation, selon la voie d'exposition, par exemple, et faire la différence, s'agissant de la toxicité aiguë, comme suit: Catégorie 1 de toxicité aiguë par ingestion, Catégorie 1 de toxicité aiguë par contact cutané et Catégorie 1 de toxicité aiguë par inhalation. Si une substance ou un mélange est classé dans plusieurs catégories d'une classe de danger qui est différenciée, toutes les classifications doivent être communiquées.».

Chapitre 3.5: Mutagénicité pour les cellules germinales

(*voir INF.24 (dix-neuvième session), annexe 1, point 5*)

3.5.3.3 Modifier comme suit le tableau 3.5.1 (*les modifications sont indiquées*):

Composant classé comme:	*Seuils/limites de concentration menant à une classification du mélange comme:*		
	Mutagène de la Catégorie 1		*Mutagène de la Catégorie 2*
	Catégorie 1A	*Catégorie 1B*	
Agent mutagène de la Catégorie 1A	≥0,1 %	--	−
Agent mutagène de la Catégorie 1B	--	≥0,1 %	−
Agent mutagène de la Catégorie 2	−	--	≥1,0 %

3.5.4 Modifier comme suit le tableau 3.5.2 (*les modifications sont indiquées*):

	Catégorie 1 *(Catégorie 1A, 1B)*	~~*Catégorie 1B*~~	*Catégorie 2*
Symbole	Danger pour la santé	~~Danger pour la santé~~	Danger pour la santé
Mention d'avertissement	Danger	~~Danger~~	Attention
Mention de danger	Peut induire des anomalies génétiques (indiquer la voie d'exposition s'il est formellement prouvé qu'aucune autre voie d'exposition ne conduit au même danger)	~~Peut induire des anomalies génétiques (indiquer la voie d'exposition s'il est formellement prouvé qu'aucune autre voie d'exposition ne conduit au même danger)~~	Susceptible d'induire des anomalies génétiques (indiquer la voie d'exposition s'il est formellement prouvé qu'aucune autre voie d'exposition ne conduit au même danger)

Chapitre 3.6: Cancérogénicité

(*voir INF.24 (dix-neuvième session), annexe 1, point 5*)

3.6.3.3 Modifier comme suit le tableau 3.6.1 (*les modifications sont indiquées*):

Composant classé comme:	*Seuils/limites de concentration menant à une classification du mélange comme:*		
	Cancérogène de la Catégorie 1		*Cancérogène de la Catégorie 2*
	Catégorie 1A	*Catégorie 1B*	
Agent cancérogène de la Catégorie 1A	≥0,1 %	--	--
Agent cancérogène de la Catégorie 1B	--	≥0.1 %	--
Agent cancérogène de la Catégorie 2	--	--	≥0,1 % (nota 1) ≥1,0 % (nota 2)

3.6.4 Modifier comme suit le tableau 3.6.2 (*les modifications sont indiquées*):

	Catégorie 1 *(Catégorie 1A, 1B)*	*~~Catégorie 1B~~*	*Catégorie 2*
Symbole	Danger pour la santé	~~Danger pour la santé~~	Danger pour la santé
Mention d'avertissement	Danger	~~Danger~~	Attention
Mention de danger	Peut provoquer le cancer (indiquer la voie d'exposition s'il est formellement prouvé qu'aucune autre voie d'exposition ne conduit au même danger)	~~Peut provoquer le cancer (indiquer la voie d'exposition s'il est formellement prouvé qu'aucune autre voie d'exposition ne conduit au même danger)~~	Susceptible de provoquer le cancer (indiquer la voie d'exposition s'il est formellement prouvé qu'aucune autre voie d'exposition ne conduit au même danger)

Chapitre 3.7: Toxicité pour la reproduction

(*voir INF.24 (dix-neuvième session), annexe 1, point 5*)

3.7.3.3.2 Modifier comme suit le tableau 3.7.1 (*les modifications sont indiquées*):

	Seuils/limites de concentration menant à la classification du mélange comme:			
	Toxique pour la reproduction de Catégorie 1		*Toxique pour la reproduction de Catégorie 2*	*Ayant des effets sur ou via l'allaitement (catégorie supplémentaire)*
Composant classé comme:	*Catégorie 1A*	*Catégorie 1B*		
Toxique pour la reproduction de la Catégorie 1A	≥0,1 % (nota 1) ≥0,3 % (nota 2)	--	--	--
Toxique pour la reproduction de la Catégorie 1B		≥0,1 % (nota 1) ≥0,3 % (nota 2)	--	--
Toxique pour la reproduction de la Catégorie 2	--		≥0,1 % (nota 3) ≥3,0 % (nota 4)	--
Ayant des effets sur ou via l'allaitement (catégorie supplémentaire)	--	--	--	≥0,1 % (nota 1) ≥0,3 % (nota 2)

3.7.4 Modifier comme suit le tableau 3.7.2 (*les modifications sont indiquées*):

	Catégorie 1 *(Catégorie 1A, 1B)*	*~~Catégorie 1B~~*	*Catégorie 2*	*Catégorie supplémentaire pour les effets sur ou via l'allaitement*
Symbole	Danger pour la santé	~~Danger pour la santé~~	Danger pour la santé	Pas de symbole
Mention d'avertissement	Danger	~~Danger~~	Attention	Pas de mention d'avertissement
Mention de danger	Peut nuire à la fertilité ou au fœtus (indiquer l'effet s'il est connu) (indiquer la voie d'exposition s'il est formellement prouvé qu'aucune autre voie d'exposition ne conduit au même danger)	~~Peut nuire à la fertilité ou au fœtus (indiquer l'effet s'il est connu) (indiquer la voie d'exposition s'il est formellement prouvé qu'aucune autre voie d'exposition ne conduit au même danger)~~	Susceptible de nuire à la fertilité ou au fœtus (indiquer l'effet s'il est connu) (indiquer la voie d'exposition s'il est formellement prouvé qu'aucune autre voie d'exposition ne conduit au même danger)	Peut être nocif pour les bébés nourris au lait maternel

Chapitre 4.1: Dangers pour le milieu aquatique

(voir INF.24 (dix-neuvième session), annexe 1, point 4)

4.1.3.6 Ajouter la phrase suivante à la fin du paragraphe existant:

«L'autorité compétente peut décider soit de préciser que la mention supplémentaire soit indiquée sur l'étiquette ou sur la FDS ou sur les deux, soit de laisser au fabricant/fournisseur le choix de l'emplacement de la mention.».

4.1.5.1.1 Dans la note de bas de page 3 s'appliquant au diagramme de décision, introduire une nouvelle phrase, libellée comme suit:

«L'autorité compétente peut décider soit de préciser que la mention supplémentaire soit indiquée sur l'étiquette ou sur la FDS ou sur les deux, soit de laisser au fabricant/fournisseur le choix de l'emplacement de la mention.».

4.1.5.2.4 Dans la note de bas de page 10 s'appliquant au diagramme de décision, introduire, à la fin du texte existant, la phrase suivante:

«L'autorité compétente peut décider soit de préciser que la mention supplémentaire soit indiquée sur l'étiquette ou sur la FDS ou sur les deux, soit de laisser au fabricant/fournisseur le choix de l'emplacement de la mention.».

Annexe 2

[Anglais seulement]

Bridging principles examples

These examples will be proposed for inclusion in the training document which is being developed by the United Nations Institute for Training and Research (UNITAR) (see UN/SCEGHS/19/INF.24, Annex 2).

1. Dilution bridging principle example

The purpose of this example is to illustrate how the dilution bridging principle criteria can be applied. While this specific example uses acute toxicity data, the reader is reminded that the dilution bridging principle can be applied to other hazard classes as prescribed in the purple book.

Dilution

If a tested mixture is diluted with a diluent that has an equivalent or lower toxicity classification than the least toxic original ingredient, and which is not expected to affect the toxicity of other ingredients, then the new diluted mixture may be classified as equivalent to the original tested mixture. Alternatively, the formula explained in 3.1.3.6.1 could be applied.

Tested mixture information:

Acute toxicity classification and test data		
Oral	**Dermal**	**Inhalation vapours**
Category 4 (LD_{50}: 310 mg/kg)	**Category 4** (LD_{50}: 1250 mg/kg)	**Category 2** (LC_{50}: 1.97 mg/l)

Information on ingredients in the tested mixture:

Ingredient	**Wt%**	**Acute toxicity Classification and Test Data**		
		Oral	**Dermal**	**Inhalation vapours**
Ingredient 1	26	**Category 5** (LD_{50}: 2737 mg/kg)	**Category 4** (LD_{50}: 1500 mg/kg)	**Category 4** (LC_{50}: 11 mg/l)
Ingredient 2	40	**Category 3** (LD_{50}: 118 mg/kg)	**Category 4** (LD_{50}: 1250 mg/kg)	**Category 3** (LC_{50}: 4 mg/l)
Ingredient 3	34	**Category 4** (LD_{50}: 1950 mg/kg)	**Category 4** (LD_{50}: 1100 mg/kg)	**Category 2** (LC_{50}: 1.5 mg/l)

Information on diluent:

Ingredient	Acute toxicity test data		
	Oral	**Dermal**	**Inhalation vapours**
Diluent	**Category 5** (LD_{50}: 2500 mg/kg)	**Category 3** (LD_{50}: 950 mg/kg)	**Category 5** (LC_{50}: 19 mg/l)

Information on an untested mixture:

The tested mixture is diluted 50% with an ingredient that is not expected to affect the toxicity of the other ingredients resulting in the following untested mixture:

Ingredient	Wt%
Ingredient 1	13
Ingredient 2	20
Ingredient 3	17
Diluent	50

Answer:

(a) Oral route – Classification: acute oral toxicity; Category 4

(b) Dermal route – The dilution bridging principle cannot be applied.

(c) Inhalation route – Classification: Acute inhalation toxicity; Category 2

Rationale:

(a) Since acute toxicity test data was not provided for the untested mixture classification via application of substance criteria is not possible;

(b) Classification via the application of bridging principles can be considered since there are sufficient data on both the individual ingredients and a similar tested mixture;

(c) Classification of the mixture based on ingredient information should be considered if the classifier chooses not to apply the bridging principle or sufficient data had not been available to apply the bridging principle;

Oral route

(d) The dilution bridging principle can be applied because the diluent's classification (i.e., Category 5) is an equivalent toxicity classification category as the least toxic original ingredients (i.e., ingredient 1 which is also classified in Category 5);

Dermal route

(e) The dilution bridging principle can not be applied because the diluent's classification (i.e., Category 3) is in a higher toxicity classification category than the least toxic original ingredients (i.e., ingredients 1, 2, and 3 are all classified in Category 4);

(f) Classification of the mixture based on ingredient data should be considered;

Inhalation route

(g) The dilution bridging principle can be applied because the diluent's classification (i.e., Category 5) is in a lower toxicity classification category as the least toxic original ingredients (i.e., ingredient 1 is classified in Category 4).

(End of example 1)

2. Batching bridging principle example

The purpose of this example is to illustrate how the batching bridging principle criteria can be applied. While this specific example uses specific target organ toxicity – single dose data, the reader is reminded that the batching bridging principle can be applied to other hazard classes as prescribed in the purple book.

Batching

The toxicity of a tested production batch of a mixture can be assumed to be substantially equivalent to that of another untested production batch of the same commercial product when produced by or under the control of the same manufacturer, unless there is reason to believe there is significant variation such that the toxicity of the untested batch has changed. If the latter occurs, a new classification is necessary.

Background

1. Ingredient A is a complex substance that in commercial batches contains a mixture of isomers. Specific target organ toxicity – single exposure effects have been well documented for the ortho-isomers contained in ingredient A.

2. Accidental ingestion of mixtures containing ingredient A in humans due to contamination of drink and food has been reported which resulted in paralysis of the lower extremities.

3. Mixtures containing various concentrations of ingredient A have been tested over the course of many years in animal studies. The results of these studies show a direct correlation of Ingredient A's ortho-isomers concentration in the mixture to statistically significant effects in the animal studies. Based on all available data a conservative guideline is established (i.e., using a safety factor of 1000x) that any mixture containing greater than or equal to 0.5% of the ortho-isomers of ingredient A must be classified as Specific target organ toxicity – single exposure; Category 2. Mixtures containing less than 0.5% of the ortho-isomers of ingredient A are not classified.

Untested mixture information:

Manufacturing batch	Wt% of ortho-isomer of ingredient A
Batch 1	0.42
Batch 2	0.52

Answer:

(a) Batch 1: Applying the batching bridging principle the Untested Batch 1 mixture does not require classification.

(b) Batch 2: Applying the batching bridging principle the Untested Batch 2 mixture is classified as Specific target organ toxicity – single exposure; Category 2.

Rationale:

(a) Classification via application of substance criteria is not possible since Specific target organ toxicity – single exposure test data was not provided for each batch of the mixture;

(b) Classification via the application of bridging principles can be considered since there are sufficient data on both the individual ingredients and similar tested mixtures;

(c) The batching bridging principle can be applied because the tested product batches of the mixture can be assumed to be substantially equivalent to the untested production batches of the same commercial product. In those cases where there is a reason to believe that a significant variation impacts the toxicity of the batch (i.e. based on the ortho-isomer concentration) then a new classification is necessary (e.g. batch 2).

(End of example 2)

3. Concentration of highly toxic mixtures bridging principle example

The purpose of this example is to illustrate how the concentration of highly toxic mixtures bridging principle criteria can be applied. While this specific example uses acute toxicity data, the reader is reminded that the concentration of highly toxic mixtures bridging principle can be applied to other hazard classes as prescribed in the purple book.

Concentration of highly toxic mixtures

If a tested mixture is classified in Category 1, and the concentration of the ingredients of the tested mixture that are in Category 1 is increased, the resulting untested mixture should be classified in Category 1 without additional testing.

Tested mixture information:

Acute toxicity classification and test data	
Oral	**Dermal**
Category 1 (LD_{50}: 3 mg/kg)	**Category 2** (LD_{50}: 85 mg/kg)

Information on ingredients in the tested mixture:

Ingredient	**Wt%**	**Acute toxicity Classification and Test Data**	
		Oral	**Dermal**
Ingredient 1	75	**Category 1** (LD_{50}: 1 mg/kg)	**Category 2** (LD_{50}: 195 mg/kg)
Ingredient 2	25	**Category 2** (LD_{50}: 6 mg/kg)	**Category 1** (LD_{50}: 40 mg/kg)

Information on an untested mixture:

Ingredient	Wt%
Ingredient 1	80
Ingredient 2	20

Answer:

(a) Oral route – Applying the concentration of highly toxic mixtures bridging principle, the untested mixture can be classified as Oral Acute Toxicity; Category 1 without additional testing

(b) Dermal route – Concentration of highly toxic mixtures bridging principle cannot be applied.

Rationale:

(a) Classification via application of substance criteria is not possible since acute toxicity test data was not provided for the untested mixture;

(b) Classification via the application of bridging principles can be considered since there are sufficient data on both the individual ingredients and a similar tested mixture;

(c) Classification of the mixture based on ingredient information should be considered if the classifier chooses not to apply the bridging principle or sufficient data had not been available to apply the bridging principle;

Oral route

(d) The concentration of highly toxic mixtures bridging principle can be applied because the tested mixture is classified in Category 1 and the concentration of ingredient 1 (i.e., a Category 1 ingredient) has increased in the untested mixture.

Dermal route

(e) The concentration of highly toxic mixtures bridging principle cannot be applied because the tested mixture is not classified into Category 1.

(End of example 3)

4. Interpolation within one toxicity category bridging principle example

The purpose of this example is to illustrate how the interpolation within one toxicity category bridging principle criteria can be applied. While this specific example uses skin corrosion/irritation data, the reader is reminded that the interpolation within one toxicity category bridging principle can be applied to other hazard classes as prescribed in the purple book.

Interpolation within one toxicity category

For three mixtures (A, B and C) with identical ingredients, where mixtures A and B have been tested and are in the same irritation/corrosion toxicity category, and where untested mixture C has the same toxicologically active ingredients as mixtures A and B but has concentrations of toxicologically active ingredients intermediate to the concentrations in mixtures A and B, then mixture C is assumed to be in the same irritation/corrosion category as A and B.

Tested mixture information:

Skin corrosion/irritation classification and test data	
Mixture A	**Mixture B**
Skin Irritation; Category 2	**Skin Irritation; Category 2**
Animal 1: Mean Erythema/eschar: 2.5 Mean Oedema: 1.5	Animal 1: Mean Erythema/eschar: 3.8 Mean Oedema: 2.5
Animal 2: Mean Erythema/eschar: 2.3 Mean Oedema: 1.3	Animal 2: Mean Erythema/eschar: 3.5 Mean Oedema: 2.9
Animal 3: Mean Erythema/eschar: 2.2 Mean Oedema: 1	Animal 3: Mean Erythema/eschar: 4.0 Mean Oedema: 3.2

Information on ingredients in the tested mixture:

Ingredient	**Ingredient classification**	**Weight %**	
		Mixture A	**Mixture B**
Ingredient 1	Skin Corrosive; Category 1C	1	5
Ingredient 2	Skin Irritant Category 2	15	30
Water	Not Classified	84	65

Untested mixture information:

Ingredient	**Weight %**		
	Mixture A	**Mixture C**	**Mixture B**
Ingredient 1	1	4	5
Ingredient 2	15	20	30
Water	84	76	65

Answer:

Applying the interpolation within one toxicity category bridging principle the untested Mixture C can be classified as Skin Irritant; Category 2 without additional testing.

Rationale:

(a) Classification via application of substance criteria is not possible since skin corrosion/irritation test data was not provided for the untested mixture;

(b) Classification via the application of bridging principles can be considered since there are sufficient data on both the individual ingredients and a similar tested mixture;

(c) Classification of the mixture based on ingredient information should be considered if the classifier chooses not to apply the bridging principle or sufficient data had not been available to apply the bridging principle;

(d) The interpolation within one toxicity category bridging principle can be applied because:

(i) Mixtures A and B have both been tested and are in the same irritation/corrosion toxicity category (i.e., Skin Irritant; Category 2); AND

(ii) Untested Mixture C has the same toxicologically active ingredients (i.e., ingredients 1 and 2) as tested Mixtures A and B; AND

(iii) The concentrations of ingredients 1 and 2 in Mixture C are both intermediate to the concentrations of ingredients 1 and 2 in Mixtures A and B.

(End of example 4)

5. Substantially similar mixtures bridging principle example

The purpose of this example is to illustrate how the substantially similar mixtures bridging principle criteria can be applied. While this specific example uses skin sensitization data, the reader is reminded that the substantially similar mixtures bridging principle can be applied to other hazard classes as prescribed in the purple book.

Substantially similar mixtures

Given the following:

(a) Two mixtures: (i) A + B;

(ii) C + B;

(b) The concentration of ingredient B is essentially the same in both mixtures;

(c) The concentration of ingredient A in mixture (i) equals that of ingredient C in mixture (ii);

(d) Ingredient B is a sensitizer and ingredients A and C are not sensitizers;

(e) A and C are not expected to affect the sensitizing properties of B.

If mixture (i) or (ii) is already classified based on test data, then the other mixture can be assigned the same hazard category.

Background information:

1. Ingredient 1 has been used in products ranging from 1.2 to 6.0 weight percent for years without reports of sensitization.

2. Existing animal test data on ingredient 1 indicates that it is a Category 1 skin sensitizer.

3. Ingredients 2(a) and 2(b) are analogous lubricant materials with slightly different viscosities. Ingredients 2(a) and 2(b) have both been tested in animal studies and are not skin sensitizers. They are not expected to affect the sensitization potential of ingredient 1.

4. There are no data to suggest that the other ingredients are skin sensitizers or that they will affect the sensitization potential of ingredient 1.

5. Products containing ingredient 1 were then tested in animal studies, which were all negative. Subsequently, clinical study data were gathered and are summarized below:

Tested mixture information:

Product name	Wt% of ingredient 1 in product	Repeated insult patch tests # of positive cases/# Tested
Product 1	5.0	0/298
Product 2	6.0	0/198
Product 3	6.0	0/307
Product 4	5.0	0/197
Product 5	2.5	0/103
		Total: 0/1103

Detailed composition of tested mixture and substantially similar untested mixture:

Tested Mixture (Product 1)	
Ingredient	**Wt%**
Ingredient 1	5.0
Ingredient 2(a)	91.0
Ingredient 3	3.0
Ingredient 4	0.9
Ingredient 5	0.1

Untested Mixture (Product 6)	
Ingredient	**Wt%**
Ingredient 1	4.8
Ingredient 2(b)	91.2
Ingredient 3	3.0
Ingredient 4	0.9
Ingredient 5	0.1

Answer:

The untested mixture (Product 6) is not classified based on the test data available for the similar tested mixture (Product 1).

Rationale:

(a) Classification via application of substance criteria is not possible since skin sensitization test data was not provided for the untested mixture;

(b) Classification via the application of bridging principles can be considered since there are sufficient data on both the individual ingredients and a similar tested mixture;

(c) Classification of the mixture based on ingredient information should be considered if the classifier chooses not to apply the bridging principle or sufficient data had not been available to apply the bridging principle;

(d) As illustrated using the figure below, the substantially similar mixtures bridging principle can be applied because:

(i) The concentration of ingredient B (i.e., ingredient 1 in both mixtures) is essentially the same in both mixtures

(ii) Ingredient B is a sensitizer and ingredients A (i.e., ingredients 2(a), 3, 4, 5) in mixture (i) and C (i.e., ingredients 2(b), 3, 4, 5) in mixture (ii) are not sensitizers

(iii) Ingredients A and C are not expected to affect the sensitizing properties of ingredient B.

(iv) Since product 1 was already not classified based on test data, then product 6 is also not classified based on the test data.

(End of example 5)

6. Aerosols bridging principle example

The purpose of this example is to illustrate how the aerosols bridging principle criteria can be applied. While this specific example uses skin corrosion/irritation data, the reader is reminded that the aerosols bridging principle can be applied to other hazard classes as prescribed in the purple book.

Aerosols

An aerosol form of the mixture may be classified in the same hazard category as the tested non-aerosolized form of the mixture provided that the added propellant does not affect the irritation or corrosive properties of the mixture upon spraying.

Tested mixture information:

Skin Corrosion/Irritation test data
Animal 1: Mean Erythema/eschar: 3.8 Mean Oedema: 2.5
Animal 2: Mean Erythema/eschar: 3.5 Mean Oedema: 2.9
Animal 3: Mean Erythema/eschar: 4.0 Mean Oedema: 3.2

Based on the test data the mixture is classified: Skin Irritant; Category 2

The tested mixture is aerosolized using a 50/50 mixture of propane/butane as the propellant.

Aerosolized untested mixture information:

Ingredient	Weight %
Tested mixture	50
Liquefied propane	25
Liquefied butane	25

Answer:

Applying the aerosols bridging principle the aerosolized untested mixture can be classified as Skin Irritant; Category 2 without additional testing.

Rationale:

(a) Classification via application of substance criteria is not possible since skin corrosion/irritation test data was not provided for the aerosolized untested mixture;

(b) Classification via the application of bridging principles can be considered since there are sufficient data on both the individual ingredients and a similar tested mixture;

(c) The aerosols bridging principle can be applied because:

(i) The non-aerosolized mixture has been tested, and

(ii) The propellant (i.e. 50/50 mixture of liquefied propane/butane) is not corrosive or an irritant, and

(iii) The propellant will not affect the irritation properties of the mixture upon spraying.

(End of example 6)

Annexe 3

[Anglais seulement]

Hazardous to the aquatic environment examples

These examples will be proposed for inclusion in the training document which is being developed by the United Nations Institute for Training and Research (UNITAR) (see UN/SCEGHS/19/INF.24, Annex 3):

Example 1

The following example demonstrates application of the acute additivity methods when only acute toxicity data are available for all of the components of a mixture and then applying the summation method. Ingredients 1, 2, and 3 in this mixture are not classified into chronic categories because Ingredients 1, 2, and 3 are ready biodegradable and have experimentally determined bioconcentration factors (BCF) < 500.

Ingredient information:

Ingredient	Wt%	Acute toxicity data	$L(E)C_{50}$	Classification
Ingredient 1	20	Fish (96 hr LC_{50})	0.15	Acute 1 M-Factor = 1
		Crustacea (48 hr EC_{50})	11	
		Algae /aquatic plants (72 or 96 hr ErC_{50})	33	
Ingredient 2	20	Fish (96 hr LC_{50})	12	Acute 2
		Crustacea (48 hr EC_{50})	1.2	
		Algae /aquatic plants (72 or 96 hr ErC_{50})	43	
Ingredient 3	60	Fish (96 hr LC_{50})	98	Acute 3
		Crustacea (48 hr EC_{50})	91	
		Algae /aquatic plants (72 or 96 hr ErC_{50})	95	

Answer:

Mixture is Acute Category 1, M-Factor 1

Additivity formula

Applying the acute additivity formula from 4.1.3.5.2 (a):

$$\frac{\sum Ci}{L(E)C_{50_m}} = \sum_n \frac{Ci}{L(E)C_{50_i}}$$

Where:

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

Fish $LC_{50Mixture}$ = 100/(20/0.15 + 20/12 + 60/98) = 0.74 mg/l

Crustacea $EC5_{0Mixture}$ = 100/(20/11 + 20/1.2 + 60/91) = 5.22 mg/l

Algae $ErC_{50Mixture}$ = 100/(20/33 + 20/43 = 60/95) = 58.73 mg/l

Classification from additivity method: Category 1, M-Factor 1

Summation method

Acute 1: (Acute 1) x M ≥ 25%

using data from ingredients of the mixture:

(20% x 1) = 20% (Not classified)

Acute 2: (M x 10 x Acute 1) + Acute 2 ≥ 25%

using data from ingredients of the mixture:

(1 x 10 x 20%) + 20% = 220% (Classified)

Classification from summation method: Acute Category 2

Rationale:

(a) Classification via application of substance criteria is not possible since acute aquatic toxicity test data was not provided for the mixture as a whole (paragraph 4.1.3.3);

(b) Classification via the application of bridging principles is not possible since data on a similar mixture was not provided (paragraph 4.1.3.4);

(c) Classification based on ingredient data for the mixture can be considered (paragraph 4.1.3.5);

(d) Adequate toxicity data is available for more than one ingredient so the additivity formulas can be considered (paragraph 4.1.3.5.2);

(e) Classification of the mixture based on the acute summation method should be considered (paragraph 4.1.3.5.5) if the additivity formula is not applied;

(f) Applying the "relevant ingredients" concept from paragraph 4.1.3.1 means that ingredients 1, 2, and 3 will be considered when applying the acute additivity formula (paragraph 4.1.3.5.2 (a)) and the summation method (paragraph 4.1.3.5.5).

(g) Since the mixture was classified in more than one way, the method yielding the more conservative result was used (paragraph 4.1.3.5.4);

Additivity formula

(g) All ingredients have acute aquatic toxicity data available for all taxonomic groups (i.e. fish, crustacean and algae) so the toxicity was calculated for each taxonomic group and the lowest value (i.e. Fish) was used to determine the classification (paragraph 4.1.3.5.3);

Summation method

(h) The summation method for acute categories described in paragraph 4.1.3.5.5.3 applies and the cut-off value/concentration limits provided in Table 4.1.3 are used for classification.

(End of example 1)

Example 2

The following example demonstrates application of the acute and chronic summation methods when classification information is available for some or all of the ingredients of a mixture but the $L(E)C_{50}$ data upon which classification is based are not available to the classifier of the mixture.

Ingredient information:

Ingredient	Wt%	Acute classification (M-factor)	Chronic classification (M-factor)
Ingredient 1	0.01	Acute 1 (M-factor: 10)	Chronic 1 (M-factor: 10)
Ingredient 2	1.0	Acute 2	Chronic 2
Ingredient 3	25.0	Not classified	Chronic 4
Ingredient 4	68.76	Not classified	Not classified

Answer:

Acute Classification - Not classified because:

Acute 1: (Acute 1) x M ≥ 25%

using data from ingredients of the mixture:

(0.01% x 10) = 0.1% (Not classified)

Acute 2: (M x 10 x Acute 1) + Acute 2 ≥ 25%

using data from ingredients of the mixture:

(10 x 10 x 0.01%) + 1.0% = 2.0% (Not classified)

Acute 3: (M x 100 x Acute 1) + (10 x Acute 2) + Acute 3 ≥ 25%

using data from ingredients of the mixture:

(10 x 100 x 0.01%) + (10 x 1.0) = 20% (Not classified)

Chronic Classification - Category 4 because:

Chronic 1: (Chronic 1) x M ≥ 25%

using data from ingredients of the mixture:

0.01% x 10 = 0.1% (Not classified)

Chronic 2: (M x 10 x Chronic 1) + Chronic 2 ≥ 25%

using data from ingredients of the mixture:

(10 x 10 x 0.01%) + 1.0% = 2% (Not classified)

Chronic 3: (M x 100 x Chronic 1) + (10 x Chronic 2) + Chronic 3 ≥ 25%

using data from ingredients of the mixture:

(10 x 100 x 0.01%) + (10 x 1.0%) = 20% (Not classified)

Chronic 4: Chronic 1 + Chronic 2 + Chronic 3 + Chronic 4 ≥ 25%

using data from ingredients of the mixture:

0.01% + 1.0% + 25.0% = 26.01% (Classified)

Rationale:

(a) Classification via application of substance criteria is not possible since aquatic toxicity test data was not provided for the mixture (paragraph 4.1.3.3);

(b) Classification via the application of bridging principles is not possible since data on a similar mixture was not provided (paragraph 4.1.3.4);

(c) Classification based on ingredient data for the mixture can be considered (paragraph 4.1.3.5);

(d) Adequate toxicity data is not available so the additivity formulas cannot be considered (paragraph 4.1.3.5.2);

(e) Acute and chronic classification data is available for some of the ingredients of the mixture so the summation method can be considered (paragraph 4.1.3.5.5);

Acute classification:

(f) Applying the "relevant ingredients" concept from paragraph 4.1.3.1 means that:

(i) The use of expert judgment is necessary to make the "relevant ingredient" decision for ingredient 1 since it is a highly toxic ingredient with an M-factor of 10. In this case it was decided to include the ingredient because its concentration in the mixture (i.e., 0.01%) is still significant given the M factor and the constants used in the Acute 2 and 3 calculations for Acute 1 ingredients;

(ii) Ingredient 2 will be included in the calculation because it is in the mixture at a concentration ≥ 1%;

(g) The acute summation method approach described in paragraph 4.1.3.5.5.3 applies and the cut-off value/concentration limits provided in Table 4.1.3 are used for classification.

Chronic classification:

(h) Applying the "relevant ingredients" concept from paragraph 4.1.3.1 means that:

(i) The use of expert judgment is necessary to make the "relevant ingredient" decision for ingredient 1 since it is a highly toxic ingredient with an M-factor of 10. In this case it was decided to include the ingredient because its concentration in the mixture (i.e., 0.01%) is still significant given the M factor and the constants used in the Chronic 2 and 3 calculations for Chronic 1 ingredients.

(ii) Ingredients 2 and 3 will be included in the calculation because they are in the mixture at a concentration ≥ 1%.

(i) The chronic summation method approach described in paragraph 4.1.3.5.5.4 applies and the cut-off value/concentration limits provided in Table 4.1.4 are used for classification.

(End of example 2)

Example 3

The following example demonstrates application of a stepped approach where the additivity formula is used for the part of the mixture that has chronic toxicity data and passing that result into the chronic summation method.

Ingredient information:

Ingredient	Wt%	Chronic toxicity data	NOEC or EC_x	Rapidly degradable	Classification
Ingredient 1	15	NOEC (28 day for fish)	4.1	Yes	Chronic 3
		NOEC (21 day for crustacea)	0.13		
Ingredient 2	5	NOEC (for algae)	0.8	No	Chronic 2
Ingredient 3	80	Data not provided by supplier			Chronic 3

Answer:

Mixture is Chronic Category 3

Step 1:

Applying the chronic additivity formula from 4.1.3.5.2 (b):

$$\frac{\sum \mathrm{Ci} + \sum \mathrm{Cj}}{\mathrm{EqNOEC}_m} = \sum_n \frac{\mathrm{Ci}}{\mathrm{NOECi}} + \sum_n \frac{\mathrm{Cj}}{0.1 \times \mathrm{NOECj}}$$

where:

C_i = concentration of ingredient i (weight percentage) covering the rapidly degradable ingredients;

Cj = concentration of ingredient j (weight percentage) covering the non- rapidly degradable ingredients;

$NOEC_i$ = NOEC (or other recognized measures for chronic toxicity) for ingredient i covering the rapidly degradable ingredients, in mg/l;

NOECj = 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;

EqNOECm = 20/(15/0.13) + 5/(0.1x 0.8) = 0.11 mg/l

The part of the mixture (i.e., 20%) with Chronic toxicity data (i.e., ingredients 1 and 2) has an EqNOECm of 0.11 mg/l. As the NOEC of the ingredients that are considered not-rapidly degradable have already been multiplied with the factor 0.1 the EqNOECm can now be applied to table 4.1 b (ii) resulting in a classification of Chronic 3.

Step 2:

Ingredient information going into the chronic summation method calculations:

Ingredient	Wt %	Classification
Additivity result – part of mixture with toxicity data	20	Chronic 3
Ingredient 3	80	Chronic 3

Chronic 1: (Chronic 1) x M ≥ 25%

0% (Not classified)

Chronic 2: (M x 10 x Chronic 1) + Chronic 2 ≥ 25%

using data from the additivity result & ingredients of the mixture:

(10 x 0%) + 0% = 0% (Not classified)

Chronic 3: (M x 100 x Chronic 1) + (10 x Chronic 2) + Chronic 3 ≥ 25%

using data from the additivity result & ingredients of the mixture:

(100 x 0%) + (10 x 0%) + 20% + 80% = 100% (Classified)

Rationale:

(a) Classification via application of substance criteria is not possible since acute aquatic toxicity test data was not provided for the mixture (paragraph 4.1.3.3);

(b) Classification via the application of bridging principles is not possible since data on a similar mixture was not provided (paragraph 4.1.3.4);

(c) Classification based on ingredient data for the mixture can be considered (paragraph 4.1.3.5);

(d) Adequate toxicity data as well as classification results for the ingredients are available so the additivity formula in combination with the summation method can be considered (paragraphs 4.1.3.5.2 & 4.1.3.5.5.4);

(e) Applying the "relevant ingredients" concept from paragraph 4.1.3.1 means that ingredients 1, 2, and 3 will be considered in the calculations (paragraph 4.1.3.5.2 (b));

(f) When applying the additivity formula the preferred method is to calculate the toxicity of this part of the mixture for each ingredient toxicity values that relate to the same taxonomic group (i.e. fish, crustacean or algae) and then to use the highest toxicity obtained (i.e., use the most sensitive of the three groups). However, when toxicity data for each ingredient are not available in the same taxonomic group the data from the most sensitive test organism should be used (paragraph 4.1.3.5.3). In this case ingredient 1's toxicity data for Crustacea is used because it is has the lowest value (i.e. highest toxicity) and ingredient 2's Algae data is used;

(h) Application of the chronic additivity formula results in 20% of the mixture being classified at Chronic Category 3, which is used in the chronic summation method with the classification information provided for ingredient 3;

(End of example 3)

Example 4

The following example demonstrates application of the tiered approach to determining the mixture's classification where acute toxicity data is available on the mixture as well as on the ingredients, and chronic classification information is only available on the ingredients.

Ingredient information:

Ingredient	Wt%	Acute toxicity data	$L(E)C_{50}$ mg/l	Chronic classification
Ingredient 1	5	LC_{50} (for fish)	12	Chronic 1 (M Factor: 1)
		EC_{50} (for crustacea)	18	
		ErC_{50} (algae)	0.9	
Ingredient 2	1.5	LC_{50} (for fish)	40	Chronic 2
		EC_{50} (for crustacea)	25	
		ErC_{50} (algae)	9.5	
Ingredient 3	93.5	LC_{50} (for fish)	> 100	Chronic 4
		EC_{50} (for crustacea)	> 100	
		ErC_{50} (algae)	> 100	

Information on tested mixture:

Acute toxicity data	$L(E)C_{50}$ mg/l
LC_{50} (for fish)	68
EC_{50} (for crustacea)	90
ErC_{50} (algae)	12.5

Answer:

Acute classification - Category 3

Chronic classification - Category 2 because:

Chronic 1: (Chronic 1) x M ≥ 25%

5% x 1 = 5% (Not classified)

Chronic 2: (M x 10 x Chronic 1) + Chronic 2 ≥ 25%

using data from the ingredients of the mixture:

(1 x 10 x 5%) + 1.5% = 51.5% (Classified)

Rationale:

Acute classification:

(a) Classification via application of substance criteria is possible for acute toxicity since acute aquatic toxicity test data was provided for the mixture (paragraph 4.1.3.3);

(b) The higher toxicity value (from the most sensitive test organism) which in this case is Algae or other aquatic plants is used to classify the tested mixture (paragraph 4.1.3.3.3 (a));

Chronic classification:

(c) Classification via application of substance criteria is not possible since chronic aquatic toxicity test data was not provided for the mixture (paragraph 4.1.3.3.4 (a));

(d) Classification via the application of bridging principles is not possible since data on a similar mixture was not provided (paragraph 4.1.3.4);

(e) Adequate chronic toxicity data is not available so the chronic additivity formulas cannot be considered (paragraph 4.1.3.5.2 (b));

(f) Chronic classification data is available for some of the ingredients of the mixture so the summation method can be considered (paragraph 4.1.3.5.5);

(g) Applying the "relevant ingredients" concept from paragraph 4.1.3.1 means that ingredients 1, 2, and 3 will be considered when applying criteria in paragraph 4.1.3.5.5;

(h) The chronic summation method approach described in paragraph 4.1.3.5.5.4 applies and the cut-off value/concentration limits provided in Table 4.1.4 are used for classification.

(End of example 4)