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Issues relating to the Globally Harmonized System of Classification and Labelling of Chemicals: corrosivity criteria

Sub-Committee of Experts on the Globally Harmonized System of Classification and Labelling of Chemicals

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Classification criteria and hazard communication: Work of the TDG-GHS working group on corrosivity criteria

Comments on corrosivity criteria-proposal on concentration thresholds

Transmitted by the expert of Spain

Introduction

1. In document ST/SG/AC.10/C.3/2014/25-ST/SG/AC.10/C.4/2014/3 and informal documents 32/9, the proposed corrosivity assignation is lacking a specific concentration threshold to be able to compare the different mixtures with.

2. Spain is proposing a criterion based on a mathematical formulation, which could be used to provide these thresholds for each case. It could be used instead of the table 2.8.4 of informal documents 32/9, and the formula given in flow scheme in 2.8.1.

Proposed criterion

3. The proposed criterion to determine if something should or not be in PG I taking into account two different factors:

- The concentration of the different substances of the mixture $[\ ]_i$
- The concentration limit given by table A, X_i, for PG I

4. The formula proposed compares the concentration of the different substances present with the concentration tolerated by table A for each substance, assigning it the weight by its concentration in the mixture.

5. All of the substances contained in the mixture are taken into account, considering one by one all of the substances of PG I, and all together the other substances (PG II, PG III and non-dangerous substances).

6. The concentration of the different substances in the mixture are known or assessed. For the determination of the concentration limit X_i for PG I, following considerations are proposed, considering that X_i implies the percentage of substance at which we should "start to worry" about if this should or not be PG I :

- For substances of PG I, if there is a limit given in table A, this limit is taken as X_i.

- For substances of PG I, where no concentration limit is given in table A, this would mean either that

  (a) Either any concentration of this substances is considered dangerous enough to be packing group I, and in this case any mixture containing this should be directly classified as PG I; or

  (b) Reaching a certain concentration of dilution, the consignor starts to apply the criteria of 2.0.2.5.d) and would transport the mixture under a more appropriate N.O.S entry. In this case [, if no test data is available,] it is proposed to assign the value of 0 as concentration limit X_i, for purpose of calculation of a threshold. For maximum concentration of this substance that could be transported under PG II, see example 3.

- For all the substances of PG II, III or non-dangerous substances, a concentration limit of 100 is assigned; they will never be assigned to PG I.. For these substances, per definition 100% of the mixture could be tolerated to be out of these components without being PG I.

If case A mentioned above does not apply, the following criterion is proposed, to assign a mixture to PG I:

$$\Sigma((X_i-[\ \ ]_i)*[\ \ ]_i)<0$$

For each substance in the mixture, the concentration in which this substance is present is subtracted from its concentration limit, showing how much more substance is present above its concentration limit. Afterwards, it is multiplied by the concentration in which it is present to weight this in proportion to its concentration.

Examples

7. In a mixture with the following components within packing group I:

Component	Concentration in the mixture $[\ \ ]_i$	Concentration limit X_i
A	10%	No limit in table A, $X_A=0$
B	20%	$X_B=50\%$
C	30%	$X_C=50\%$
Rest (PG II, III, non-dangerous)	40%	$X_D=100\%$

$\Sigma(Xi-[\ \ ]i)*[\ \ ]i= (0-10)*10+(50-20)*20+(50-30)*30+(100-40)*40=-100+600+600+2400=1100/3500>0$

This mixture would be PG II since 3500 > 0. Even if component A is above its own threshold X_A, the components B and C are not, and 40% of the mixture is non-dangerous, which leads to the complete mixture to be assigned to PG II.

8. In a mixture with the following components within packing group I:

Component	Concentration in the mixture [ ]$_i$	Concentration limit X_i
A	**50%**	No limit in table A, X_A=0
B	20%	X_B=50%
C	30%	X_C=50%
Rest (PG II, III, non-dangerous)	**0%**	X_D=100%

$\Sigma(X_i\text{-}[\ ]_i)*[\ ]_i = (0\text{-}50)*50+(50\text{-}20)*20+(50\text{-}30)*30+(100\text{-}0)*0=-2500+600+600=-1300<0$

This mixture would be PG I since -1300 < 0. Here component A is above its own threshold X_A in a higher concentration; the components B and C which are below their threshold are not able to compensate it, and the mixtures also contains no non-dangerous components.

9. In a mixture with only one component within packing group I, without concentration limit in table A:

Component	Concentration in the mixture [ ]$_i$	Concentration limit X_i
A	**50%**	No limit in table A, X_A=0
Rest (PG II, III, non-dangerous)	50%	X_D=100%

$\Sigma(X_i\text{-}[\ ]_i)*[\ ]_i = (0\text{-}50)*50+(100\text{-}50)*50=-2500+2500=0$

This mixture would be PG II. This would de facto mean that for a substance which has no value of Xi assigned in table A, for mixtures with a concentration of up to 50% of this substance, this would be PG II.

Alternative possibilities

If the joint working group on corrosivity criteria considers this criterion useful, it could provide for threshold values without the necessity to fix them arbitrarily. Also, the presented criteria could be easily used to be able to assign a threshold for PG II, as was initially provided for in ST/SG/AC.10/C.3/2014/25-ST/SG/AC.10/C.4/2014/3.

The disadvantage of this approach is that a fixed value for the threshold, set by any procedure, would be more user-friendly and simpler to apply.

A different approach would be to use the formula proposed in flow scheme in 2.8.1 of informal documents 32/9. A similar formula is also used in directive 2012/18/EU on the control of mayor-accident hazards involving dangerous substances. This has not been further developed because of the mathematical problem it poses to try to divide something by 0; a different value of the threshold for substances without a threshold would need to be assigned, which leaves again open this question.

Other comments on Inf 32/9

Spain would welcome if the categories A, B and C into which GHS classifies the substances would not be directly introduced into the UN Model regulations. Instead reference should be made to categories A, B and C of GHS. This way, A, B and C keep regulated in GHS, and clearly separated from the Model Regulations, even if reference to them is made to help assigning the packing groups.