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**COMMITTEE OF EXPERTS ON THE TRANSPORT OF
DANGEROUS GOODS AND ON THE GLOBALLY
HARMONIZED SYSTEM OF CLASSIFICATION
AND LABELLING OF CHEMICALS**

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

Seventeenth session
Geneva, 29 June – 1 July 2009
Item 2(e) of the provisional agenda

**UPDATING OF THE THIRD REVISED EDITION OF THE GLOBALLY HARMONIZED
SYSTEM OF CLASSIFICATION AND LABELLING OF CHEMICALS (GHS)**

Comments on units of concentration of ingredients in mixtures

Transmitted by the European Industrial Gases Association (EIGA)¹

Introduction

1. Concentrations in gas mixtures are expressed in volume or mole %. Expressing the concentration of the active ingredient in weight % in a gas mixture would be completely misleading due the great differences of molecular weight (MW) between the dilution gases. For instance, a mixture of 1% v/v of chlorine (MW = 71) in helium or argon is equivalent to 15.4% w/w in helium (MW = 4) and 1.8% w/w in argon (MW = 44) although the number of molecules of chlorine is the same in both mixtures. Using weight percent could lead to different classification for the same level of hazard.

¹ In accordance with the programme of work of the Sub-Committee for 2009-2010 approved by the Committee at its fourth session (refer to ST/SG/AC.10/C.4/32, Annex II and ST/SG/AC.10/36, para. 14)

2. In the Purple Book, the units of the concentrations of the ingredients in a mixture are not specified the same way for each hazard class:

- In chapter 2.2 (Flammable gases) and chapter 2.4 (Oxidising gases) it is clear that the concentrations are in volume;
- In chapter 3.1 (Acute Toxicity) it is specified in 3.1.3.3 that “the relevant ingredients are those who are present in concentrations > 1% (...v/v for gases)”. A similar sentence exists in chapter 3.2 (paragraph 3.2.3.3.1) and in chapter 3.3 (paragraph 3.3.3.3.1);
- In chapter 3.4 the percentage concentrations are expressed without units (nor w/w, nor v/v);
- In chapter 3.5, the note under Table 3.5.1 specifies that for gases the cut-off values are in v/v;

There is no such note under the equivalent Table 3.6.1 in chapter 3.6 and under Table 3.7.1 in chapter 3.7, neither in chapter 3.8 nor in chapter 3.9. But the reader could deduct that the same rule on the units applies in the chapters where no rule is specified;

- Chapter 3.10 is not applicable to gases;
- The situation changes in chapter 4.1, where concentrations of ingredients are expressed in weight percentage only in 4.1.3.5.2.

Conclusion

3. There is no consistency throughout the Purple Book in the units specifying the concentration of the ingredients in mixtures:

- (a) In v/v for gases and w/w for liquids, vapours and dusts in chapters 3.1, 3.2, 3.3 and 3.5;
- (b) No units in chapters 3.4, 3.7, 3.7, 3.8 and 3.9;
- (c) In w/w only in chapter 4.1.

Proposal

4. EIGA made the proposal at the sixteenth session in INF.14:

- (a) To delete the references to w/w in chapter 4.1; and

(b) To add a new paragraph 1.3.3.2 5 to read as follows:

“1.3.3.2.5 Concentrations of ingredients in mixtures are expressed in w/w for solids, liquids, dusts, mists and vapours, and in v/v for gases.”.

5. This generic solution was not supported at the meeting. EIGA now proposes alternatively to modify the reference in 4.1.3.5.2 and in decision logic 4.1.2 of 4.1.5.1 to “*weight percentage*” with the phrase “*w/w for solids, liquids, dusts, mists and vapours, and in v/v for gases*” that is already used in Part 3 of the GHS.
