Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals

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Issues relating to the Globally Harmonized System of Classification and Labelling of Chemicals: Joint work with the GHS Sub-Committee

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

Thirty-fifth session

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Item 2 of the provisional agenda

Joint work with the Sub-Committee of Experts on the Transport of Dangerous Goods (TDG Sub-Committee)

Classification of physical hazards according to the GHS: Which combinations/cross-classifications are possible and can be assigned to chemicals?

Transmitted by the expert from Germany

1. Reference is made to informal document INF.8 (GHS Sub-Committee 34th session) in which the expert from Germany presented the question which combinations of physical hazards are possible and relevant when classifying a chemical according to the GHS.

2. The paper was welcomed and the expert from Germany was requested to take account of the comments made and to consider developing a step-wise approach for this work. The Sub-Committee of the GHS also suggested that the Sub-Committee of the TDG should be involved in this work. For ease of reference (specially to make it easier for the experts from the Sub-Committee to follow-up on the issue) the contents of informal document INF.8 (GHS Sub-Committee 34th session) as well as the cross-table with the conclusions are repeated in the Annex to this document.

3. It is proposed to add the issue of possible and impossible combinations of physical hazards under the GHS to the program of work.

4. If deemed appropriate by the Sub-Committees, the work could be handled by a correspondence group. In that case, the expert from Germany would be willing to lead that correspondence group and suggests assigning the following tasks to the correspondence group:

- discuss whether provisions/information regarding possible and irrelevant cross-classifications with regard to physical hazards is deemed useful, and if so
- discuss whether such provisions/information should be given comprehensively at one place and/or be added to the individual hazard classes,
- discuss systematically all combinations of physical hazard classes with regard to their possible simultaneous assignment to a chemical,
- and finally come up with proposals to be included in the GHS.

5. The sub-committees are requested to consider these suggestions and to outline a path forward as appropriate.

Annex

(Reproduction of the contents of informal document INF.8 (GHS Sub-Committee 34th session))

1. One of the fundamental principles of the GHS is that all hazards of a chemical should be assigned and communicated. There is no general prioritization of hazards in the sense that certain hazard classes are not applicable if another one has been assigned. In contrast to health and environmental hazards, there are physical or chemical factors which preclude certain combinations of physical hazard classes. So far, there is no common understanding as to which combinations are relevant and which not. For example, should a pyrophoric liquid be classified as flammable liquid in addition, or is this redundant and unnecessary? In the course of the implementation of the GHS by countries or sectors and the actual application by industry all over the world, such questions become more and more important.

2. For some of the combinations the GHS provides an answer, in one way or another: Some combinations are not possible due to the physical state associated with the hazard class and some are explicitly excluded by according text or notes in the GHS. But other combinations of physical hazard classes are not mentioned although the relevance of their combination might be debatable and thus might be applied differently all over the world.

3. The experts from Germany have intensely discussed the question of cross-classifications and considered systematically all possible combinations of physical hazard classes. The discussions resulted in a cross-table in which the combinations of physical hazard classes are assessed with regard to their possible applicability (see the following paragraph). Colors were assigned to all combinations as follows:

- Combinations marked in red are undoubtedly not possible, either due to the physical state or based on explicit information in the GHS;
- Combinations marked in orange are not possible, e.g. due to restrictions related to the interpretation of test results or execution of the test methods or such combinations should be precluded, e.g. for safety reasons. However, this is not stated in the GHS;
- Combinations marked in yellow might be possible or are actually assigned in some (special) cases although there might be practical problems because the criteria/test methods of one of the hazard classes cannot be applied properly due to properties associated with the other hazard class;
- Combinations marked in green are possible and must be considered when classifying a chemical.

Cross-classification / Combinations of the physical hazard classes of the UN-GHS

GHS Chapter / Hazard class		2.1 Explosives	2.2 Flammable gases	2.3 Aerosols	2.4 Oxidizing gases	2.5 Gases under pressure	2.6 Flammable liquids	2.7 Flammable solids	2.8 Self-reactives	2.9 Pyrophoric liquids	2.10 Pyrophoric solids	2.11 Self-heating	2.12 Water-reactives	2.13 Oxidizing liquids	2.14 Oxidizing solids	2.15 Organic peroxides	2.16 Corrosive to metals	2.17 Desensitized explosives
2.1	*Explosives*		p		p	p												
2.2	*Flammable gases*	p					p	p	p	p	p	p	p	p	p	p		p
2.3	*Aerosols*																	
2.4	*Oxidizing gases*	p					p	p	p	p	p	p	p	p	p	p		p
2.5	*Gases under pressure*	p					p	p	p	p	p	p	p	p	p	p		p
2.6	*Flammable liquids*		p		p	p		p	a		p				p	a		
2.7	*Flammable solids*		p		p	p	p		a	p				p		a		
2.8	*Self-reactives*		p		p	p	a	a										
2.9	*Pyrophoric liquids*		p		p	p		p			p				p			
2.10	*Pyrophoric solids*		p		p	p	p			p				p				
2.11	*Self-heating*		p		p	p												
2.12	*Water-reactives*		p		p	p												
2.13	*Oxidizing liquids*		p		p	p		p			p				p			
2.14	*Oxidizing solids*		p		p	p	p			p				p				
2.15	*Organic peroxides*		p		p	p	a	a										
2.16	*Corrosive to metals*																	
2.17	*Desensitized explosives*		p		p	p												

Explanation

p	not possible due to the physical state associated with the hazard class
	not possible based on explicit according information in the GHS
	not possible or not relevant due to other reasons
	might be possible under certain conditions
	possible
a	*self-reactive substances and mixtures* or *organic peroxides* of type G might have to be classified as *flammable liquid* or *flammable solid* if a flammable diluent is used

4. This cross-table and the underlying considerations have been published as follows: "UN-GHS Physical hazard classifications of chemicals: A critical review of combinations of physical hazard classes" Journal of Chemical Health & Safety 24(6), 15-28 (2017), see https://www.sciencedirect.com/science/article/pii/S1871553217300336. The pre-print of the manuscript is freely available at: https://www.researchgate.net/publication/315997108.

5. The assessment as summarized in the cross-table (Table 1 in the above-mentioned publication) shows that there is a comparatively large number of combinations for which an unambiguous decision based on the GHS is not possible (orange and yellow combinations).

6. As one additional milestone on the path to a globally harmonized system for the classification of chemicals, the question of cross-classification of physical hazards should be discussed and ultimately solved on a global basis. Therefore, the Sub-committee is invited to consider the issue. The expert from Germany would be happy to assist the process should the Sub-Committee decide that this subject should be pursued, that clarification is deemed helpful and/or that information to that regard should be added to the GHS.