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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  
Transport of Dangerous Goods****Thirty-eighth session**

Geneva, 29 November–7 December 2010

Item 11 of the provisional agenda

**Issues relating to the Globally Harmonized System  
of Classification and Labelling of Chemicals (GHS)****Sub-Committee of Experts on the Globally Harmonized  
System of Classification and Labelling of Chemicals****Twentieth session**

Geneva, 7–9 December 2010

Item 2(a) of the provisional agenda

**Updating of the third revised edition of the Globally  
Harmonized System of Classification and Labelling of  
Chemicals (GHS): physical hazards****Classification of chemically unstable gases and gas mixtures****Transmitted by the expert from Germany on behalf of the informal  
working group<sup>1</sup>****Background**

1. Informal documents about the status of the development of criteria and a test method for the classification of chemically unstable gases were submitted to the Sub-Committee of Experts on the Transport of Dangerous Goods (TDG Sub-Committee) and the Sub-Committee of Experts on the GHS (GHS Sub-Committee) at their July 2009 and July 2010 sessions. The progress made was noted with satisfaction and the TDG Sub-Committee agreed that the test method should be included in the Manual of Test and Criteria (refer to ST/SG/AC.10/C.3/70, paragraph 85).

2. The subsequent text in paragraphs 3 to 12 is basically repeating the explanations that given in informal document INF.25 (for the nineteenth session of the GHS Sub-Committee) and INF.62 (for the thirty-seventh session of the TDG Sub-Committee). In addition, it takes into account comments made during and after the last sessions of both sub-committees.

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<sup>1</sup> 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.3/68, para. 118 (i) and ST/SG/AC.10/36, para. 14).

## Amendments to the GHS

3. The Annex to this document contains the proposal for including the classification of chemically unstable gases in Chapter 2.2 of the GHS as presented in principal at previous sessions. Proposed amendments to Chapter 2.2 are shown in red and underlined.
4. According to the proposal, no new hazard class is added to the GHS but chemically unstable gases are incorporated into the hazard class of flammable gases. The hazard statement of category 2 is amended in order to distinguish it from category 1. A symbol and signal word are not assigned because they are already assigned based on the classification as flammable gas.
5. Gases which are classified as chemically unstable according to the proposed method are classified as flammable as well. The according precautionary statements aiming at explosion protection do apply as well. Further precautions are rather specific and therefore only one additional precautionary statement is proposed: P202 "Do not handle until all safety precautions have been read and understood".
6. Sectors that implement the GHS, such as the transport of dangerous goods, may choose not to implement these GHS-categories, by using the building block approach.

## Test method for determining chemical instability of gases

7. Document ST/SG/AC.10/C.3/2010/70–ST/SG/AC.10/C.4/2010/10, contains in its Annex a proposal for a method for determining whether a gas is chemically unstable. This method is proposed to be included into the Manual of Tests and Criteria and is referred to in Chapter 2.2 of the GHS.
8. However, since it will take longer to include the test method into the Manual of Tests and Criteria, the respective reference in the GHS will be to ST/SG/AC.10/C.4/2010/10 (as shown in paragraph 2.2.4.3 in the Annex below). This reference shall be replaced by the reference to the Manual of Tests and Criteria as soon as it is amended accordingly.
9. The proposal for the test method has been amended based on the comments received during the last session. It now includes more detailed information as to when testing is necessary or can be waived. It therefore refers to the calculation method described in ISO 10156 (so far this reference was included in the proposal for Chapter 2.2 only) and it lists functional groups which indicate that a gas might be chemically unstable.

## Concentration limits

10. The proposed test method contains also a table with specific concentration limits and a generic concentration limit which is supposed to limit the amount of testing. Gas mixtures containing a chemically unstable gas below the respective concentration limits are considered as chemically stable and do not have to be tested.
11. Further specific concentration limits may be added at a later stage if appropriate data are available.

## Proposal

12. Both sub-committees are asked to agree to the proposed amendments to the GHS as shown in the Annex to this document and to the method for determining chemical instability of gases and gas mixtures as contained in ST/SG/AC.10/C.3/2010/70–ST/SG/AC.10/C.4/2010/10.

13. Furthermore, it is asked to agree to the assignment of precautionary statement P202 to gases which are classified as chemically unstable gases.

14. Consequential amendments arising from the proposals in paragraphs 12 and 13 are necessary in the following sections of the GHS:

- Chapter 1.2, Definitions
- Annex 1, Table for flammable gases
- Annex 2, A.2.2
- Annex 3, Section 1, Table A3.1.1
- Annex 3, Section 2, Table A3.2.2
- Annex 3, Section 3, Tables for flammable gases

## Annex

### Proposed amendments to the GHS

#### “Chapter 2.2

#### Flammable gases (including chemically unstable gases)

##### 2.2.1 Definitions

2.2.1.1 A *flammable gas* is a gas having a flammable range with air at 20 °C and a standard pressure of 101.3 kPa.

2.2.1.2 A *chemically unstable gas* is a flammable gas that is able to react explosively even in the absence of air or oxygen

##### 2.2.2 Classification criteria

2.2.2.1 A flammable gas is classified in one of the two categories for this class according to the following table:

**Table 2.2.1: Criteria for flammable gases**

Category	Criteria
1	Gases, which at 20 °C and a standard pressure of 101.3 kPa: (a) are ignitable when in a mixture of 13% or less by volume in air; or (b) have a flammable range with air of at least 12 percentage points regardless of the lower flammable limit.
2	Gases, other than those of Category 1, which, at 20 °C and a standard pressure of 101.3 kPa, have a flammable range while mixed in air.

**NOTE 1:** Ammonia and methyl bromide may be regarded as special cases for some regulatory purposes.

**NOTE 2:** Aerosols should not be classified as flammable gases. See Chapter 2.3.

2.2.2.2 A flammable gas that is also chemically unstable is additionally classified in one of the two categories for chemically unstable gases [using the methods described in Part III of the Manual of Tests and Criteria] according to the following table:

**Table 2.2.2: Criteria for chemically unstable gases**

<u>Additional category of chemically unstable gas</u>	<u>Criteria</u>
<u>1</u>	<u>Flammable gases which are chemically unstable at ambient temperature and pressure</u>
<u>2</u>	<u>Flammable gases which are chemically unstable at elevated temperature and/or pressure</u>

### 2.2.3 Hazard communication

General and specific considerations concerning labelling requirements are provided in *Hazard communication: Labelling* (Chapter 1.4). Annex 2 contains summary tables about classification and labelling. Annex 3 contains examples of precautionary statements and pictograms which can be used where allowed by the competent authority.

**Table 2.2.3: Label elements for flammable gases (including chemically unstable gases)**

	<u>Flammable gas</u>		<u>Chemically unstable gas</u>	
	<u>Category 1</u>	<u>Category 2</u>	<u>Additional category 1</u>	<u>Additional category 2</u>
<b>Symbol</b>	Flame	<i>No symbol</i>	<i>No symbol</i>	<i>No symbol</i>
<b>Signal word</b>	Danger	Warning	<i>No signal word</i>	<i>No signal word</i>
<b>Hazard statement</b>	Extremely flammable gas	Flammable gas	<u>May react explosively even in the absence of air</u>	<u>May react explosively even in the absence of air at elevated pressure</u>

### 2.2.4 Decision logic and guidance

The decision logics and guidance, which follow, are not part of the harmonized classification system, but have been provided here as additional guidance. It is strongly recommended that the person responsible for classification studies the criteria before and during use of the decision logic.

#### 2.2.4.1 Decision logic for the classification of flammable gases

To classify a flammable gas, data on its flammability are required. The classification is according to decision logic 2.2 (a).

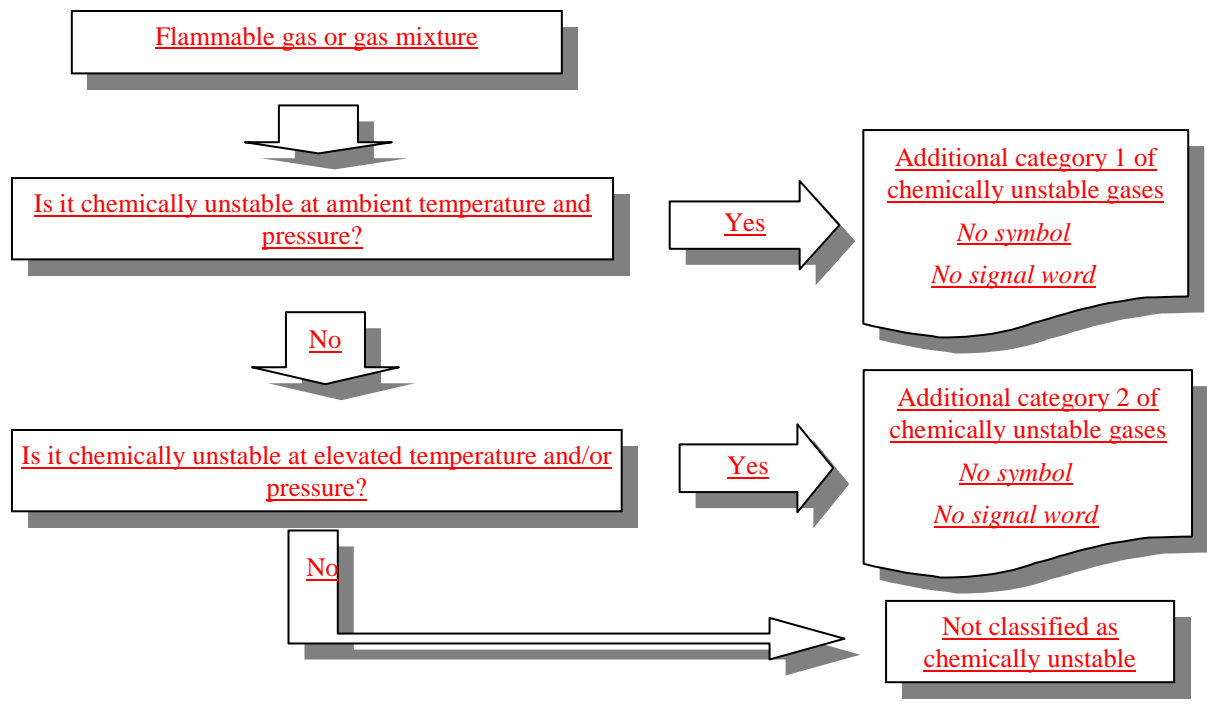
##### **Decision logic 2.2 (a)**

<Unchanged decision logic as currently in section 2.2.4.1>

#### 2.2.4.2 Decision logic for the classification of chemically unstable gases

To classify a flammable gas as chemically unstable, data on its chemical instability are required. The classification is according to decision logic 2.2 (b).

Decision logic 2.2 (b)



**2.2.4.3** *Guidance*

Flammability should be determined by tests or by calculation in accordance with methods adopted by ISO (see ISO 10156:2010 “Gases and gas mixtures – Determination of fire potential and oxidizing ability for the selection of cylinder valve outlets”). Where insufficient data are available to use these methods, tests by a comparable method recognized by the competent authority may be used.

Chemical instability should be determined in accordance with the method described in [ST/SG/AC.10/C.4/2010/10 (www.unece.org/trans/main/dgdb/dgsubc4/c42010.html)][Part III of the Manual of Tests and Criteria]. If the calculations in accordance with ISO 10156:2010 show that a gas mixture is not flammable it is not necessary to carry out the tests for determining chemical instability for classification purposes.

**2.2.5 Example: Classification of a flammable gas mixture by calculation according to ISO 10156:2010**

<Unchanged text as currently in section 2.2.5>”