

**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

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

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**PROGRAMME OF WORK FOR THE BIENNIUM 2009-2010**

Performance of the Test Method N.5,

Transmitted by the expert from Germany

This Inf. Document is related to Document ST/SG/AC.10/C.3/2008/68 –  
ST/SG/AC.10/C.4/2008/19

**Introduction**

1. In Document ST/SG/AC.10/C.3/2008/68 – ST/SG/AC.10/C.4/2008/19, the experts from France and Germany propose to work on test method N.5 of the Manual of Tests and Criteria and gave the reasoning for the proposed action. This Inf. Document gives further information that work on test method N.5 additionally is necessary as far as measurement of flammable gases including evolution rates is concerned.

2. The expert from Germany notices, that the test results according to the Test N.5 "Test method for substances which in contact with water emit flammable gases" in some cases give different results/ classifications depending on the test procedure (mass of the substance used for the test, volume of water, detection of the rate of gas emission).

**Discussion**

3. Amongst others the exploratory investigations of the BAM Federal Institute of Material Research and Testing of Germany showed that the classification depends on the sample mass and the volume of the water, which was used for the test.

Example: Mixture based on aluminium granulate

Test period : 5 days (120 h), evolution of gas was measured gravimetrically.

Mass of the substance in the test	Volume of water	Max. rate of gas emission	Start of gas emission after	Result
10 g	20 ml	0,14 litre/kg.h*	-	Not 4.3
25 g	40 ml	26,17 litre/kg.h	> 70 h	4.3, PG II

Note \*: After 6 days (144 h) the maximum rate of gas emission was 35,80 litre/kg.h

4. The procedure of the classification describes the following conditions

*The rate of evolution of gas is calculated over 7 hours at 1 hour intervals. If the rate of evolution is erratic or is increasing after 7 hours, the measuring time should be extended to a maximum time of 5 days*

which gives a wide scope of interpretation.

Depending on the accuracy and precision of the measuring method used for the evaluation of the rate of evolution, the test may be stopped after 7 hours, if the rate of evolution is not erratic and is also not increasing and consequently the substances will not be classified in Division 4.3. In some of these cases the evaluation of gas will start later and the maximum rate of evolution of flammable gases might be much higher than 1 litre per kilogram of substance per hour.

5. During a recent inter-laboratory comparison on the evaluation of UN Test N.5 "Test method for substances which in contact with water emit flammable gases" carried out under the lead of the Federal Institute for Materials Research and Testing (BAM) of Germany the same substance (homogenized) was tested by different testing institutes world-wide. It was observed that the scattering between the test results (flammable gas evolution rate) of the test method is relatively large (range of all Single values: 0,4 to 5,7 l/kg per hour, range of the Laboratory maximum values: 1,63 to 5,7 l/kg per hour, range of the Laboratory mean: 1.0 to 5.2 l/kg per hour, Robust mean value overall laboratories (Reference value): 3.18 l/kg per hour).

6. It was found out inter alia, that the laboratories determine the gas evolution rate with different methods/measuring devices:

- a) Gravimetry
- b) Volumetry
- c) Volumetry with magnetic stirrer
- d) Volumetry with a pressure gauge
- e) Volumetry with gas flow meter
- f) Volumetry with automated gas burette

7. Additionally some investigations should be done to examine the possible adaptation of the test method to measure lower gas rates.

**Proposal**

8. Therefore the expert from Germany is of the view, that some work should be carried out on test method N.5 to achieve better performance of this test method for testing substances which in contact with water develop flammable gases in addition to work to enable test method N.5 for testing substances which in contact with water develop toxic gases (including very low emission rates well below the current 1l/kg/h rate).

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