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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

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TRANSPORT OF EXPLOSIVES

Classification of 1-hydroxybenzotriazole, anhydrous (HOBt), under a division of Class 1 (Informal paper with regard to paper ST/SG/AC.10/C.3/2005/29)

Submitted by the expert from Germany

The Sub-Committee of Experts agreed on its twenty-eighth session that the substance 1-hydroxybenzotriazole, anhydrous, belonged to Class 1 but not necessarily to Division 1.1, Compatibility Group D. Several experts requested that the proposal should be backed by additional information on the result of test series 6, results concerning the product in its hydrated forms and the quantities carried.

In the following information are given as desired:

1. **1-Hydroxybenzotriazole, anhydrous; results of test series 6**

Test 6 (a): 2 kg substance in a plastic drum, detonator (0.6 g PETN) and a piece of "Prime Cambric"
Result: The drum was not fragmented, no substance remained.
No mass explosion. Not Division 1.1.

Test 6 (b): It was not necessary to perform the test. On basis of the result of the 6 (a) test a propagation from one package to another is not possible.

Test 6 (c): It was not possible to carry out a 6 (c) test because a larger amount of the substance was not available. Currently, no German producer is willing to deliver anhydrous HOBt owing to an accident (deflagration of a larger amount during drying). Therefore, the following calculations were made:

Calculation on basis of a 6 (c) test with HOBt, wetted with 12,1 % water, by mass

Test 6 (c):	50 kg in a 100 l fibre drum (1G) Burning rate: 29.1 kg/min, extrapolation (A~$m^{2/3}$, 100 kg): 46 kg/min
Test N.1 (HOBt, anhydrous):	50 mm/s
Test N.1 (HOBt, 12-17 % water):	2.85 mm/s (80 mm) ratio (HOBt, anhydrous /HOBt, 12-17 % water) → 17 : 1
Test C.2 (HOBt, anhydrous):	7.14 mm/s
Test C.2 (HOBt, 12-17 % water):	no deflagration ("< 0.35 mm/s") ratio (HOBt, anhydrous /HOBt, 12-17 % water) → 20 : 1
Calculation:	46 kg/min x 17 = 782 kg/min (7-8 s for 100 kg)
Borderline for Division 1.3:	< (35+x) s for 100 kg
Conclusion:	HOBt, anhydrous, should be assigned to Division 1.3 (x: $H_{C(HOBt)}$ >> 12500 J/g, x > 1)

Calculation on basis of a 6 (c) test with TBTU*)

Test 6 (c):	6 x 20 kg in plastic drums (1H2) Burning rate: 31.3 kg/min
Test N.1 (HOBt, anhydrous):	50 mm/s
Test N.1 (TBTU):	3.0 mm/s ratio (HOBt, anhydrous /TBTU) → 16 : 1
Calculation:	31 kg/min x 16 = 496 kg/min (12 s for 100 kg)
Conclusion:	HOBt, anhydrous, should be assigned to Division 1.3

Final conclusion: Although the test 6 (a) on HOBt, anhydrous, was carried out only with a small package, the result should be assignable also for larger (soft) packages. Metal packagings should not be allowed without separate tests according to test series 6. The above-specified calculations show that HOBt, anhydrous, should be assigned to Class 1, Division 1.3, and Compatibility Group C. Obviously, the main dangerous property of HOBt, anhydrous, is the ability to propagate a deflagration.

*) TBTU: O-(1H-Benzotriazole-1-yl)-N,N,N',N'-tetramethyluronium tetrafluoroborate; a substance with the same basic structure as HOBt.

2. **1-Hydroxybenzotriazole, hydrated or wetted with different amounts of water**

The following table shows results of UN tests on HOBt, homogeneous wetted with different amounts of water. HOBt, monohydrate, contains about 11.7 % water. The results show primarily that

- even with 50 % water, by mass, the substance is sensitive to the effect of intense heat under defined confinement, and
- the ability to propagate a deflagration decreases with increasing water content.

	Detonation test UN A.1	Koenen test UN E.1 [mm]	BAM-Fallhammer [J]	T/p test UN C.1 [ms]	TRAUZL test UN F.3 [mm]	-ΔU DSC (5 K/min) [J/g]
HOBt, anhydrous	Yes	10.0	10	< 0.5	94	2259
HOBT with 10 % water	Yes	3.5	20		74	1974 (12 % water)
HOBT with 12,9 % water	Partial	3.0	20	from 63 to 424		1693
HOBT with 20 % water	No	(3.5) rewetted	20			
HOBt with 44 % water		2.0	> 40	no ignition	6	1363
HOBt with 50 % water		2.0	> 40			

Test 6 (c)

Test sample:	HOBt, wetted with 12,1 % water, by mass
Sample condition:	50 kg in a 100 l fibre drum (1G), above wooden crib fire
Observation:	Burning rate: 29.1 kg/min, only slow burning with black smoke occurred
Result:	No effects which would hinder fire fighting

It is proposed to assign HOBt, anhydrous (dry), to Division 1.3 (see above). The substance HOBt, monohydrate or wetted with not less than 11.7 % water, by mass, is not manufactured with the view to producing a practical explosive or pyrotechnic effect. Therefore, the conclusion should be “not Class 1”.

3. **Revised Proposals**

Considering the test results obtained, it is proposed to assign the substance 1-Hydroxybenzotriazole, dry or wetted with less than 11.7 % water, by mass, to Division 1.3 C.

Proper shipping name:	1-Hydroxybenzotriazole, dry or wetted with less than 11.7 % water, by mass
Class or Division:	1.3 C
UN number:	xxxx
Concentration:	100 %
Subsidiary risk:	(-)
Special Provisions:	(-)
Packing method:	P114 (b) *Special packing instructions:* *PP48: For UN xxxx, metal packagings shall not be used.* *PP50: For UN Nos. 0160, 0161 and xxxx, inner packagings are not necessary when drums are used as the outer packaging.*

Considering the test results obtained, it is proposed to assign the substance 1-Hydroxybenzotriazole, monohydrate or wetted with more than 11.7 % water, by mass, to Division 4.1.

Proper shipping name:	1-Hydroxybenzotriazole, monohydrate or wetted with not less than 11.7 % water, by mass
Class or Division:	4.1
UN number:	xxxx
Subsidiary risk:	(-)
Special Provisions:	(28)
Packing group:	I
Packing method:	P406 *Special packing instructions:* *PP48: For UN xxxx, metal packagings shall not be used.*
