



Distr. GENERAL

ST/SG/AC.10/C.3/2005/29 1 September 2005

Original: ENGLISH

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

Twenty-eighth session, 28 November-7 December 2005 Item 5 of the provisional agenda

LISTING, CLASSIFICATION AND PACKING

Classification of 1-hydroxybenzotriazole, anhydrous (HOBt), under Division 1.1D

Transmitted by the expert from Germany

1. Background and properties

For many years, the substance 1-Hydroxybenzotriazole, anhydrous (HOBt), has been placed on the market all over the world and is used as a peptide-coupling reagent. However, people are not often aware that this compound shows explosive properties when heated under defined confinement or when subjected to mechanical stimulus. 1-Hydroxybenzotriazole (HOBt) is able to propagate a detonation when a stronger booster is used. The most hazardous property of HOBt is the ability to propagate a deflagration very rapidly according to UN Test C.1 of the Manual of Tests and Criteria. Currently, there is the situation that this substance is mostly not classified correctly on the basis of test results and, consequently, not classified according to the principles of the UN Recommendations on the Transport of Dangerous Goods.

1-Hydroxybenzotriazole can already be found in catalogues of commercial fine chemicals mostly without any references to the above-mentioned properties.

The compound was tested at the Federal Institute for Materials Research and Testing (BAM) according to the UN test methods for explosive substances of Class 1. The data obtained are presented on the following pages (Annex 1). In the opinion of the German expert, the outcome of the tests is, that 1-Hydroxybenzotriazole, anhydrous, is doubtless a substance of Class 1.1D. It is not necessary to perform tests of Test Series 6 because the test results of test Series 1 and 2 show the high sensitivity of the substance to shock, the violent effect of heating under confinement and the ability to propagate a deflagration rapidly. In all probability, a single package test (test 6(a)) with an igniter leads to a mass explosion. The data sheet (Annex 2) gives further information necessary for classification.

ST/SG/AC.10/C.3/2005/29 page 2

2. Proposal

•

Considering the test results obtained (Annex 1), it is proposed to assign the substance 1-Hydroxybenzotriazole, anhydrous, to Division 1.1D.

:	1-Hydroxybenzotriazole, anhydrous
:	1.1D
:	XXXX
:	100 %
:	(-)
:	(-)
:	Packing instruction 112(c).
	Special packing instruction PP48: For UN Nos. 0504 and xxxx, metal packagings shall not be used

ST/SG/AC.10/C.3/2005/29 page 3 Annex 1

Annex 1 (English only)

Test Report

1.	Name of substance	:	1-Hydroxybenzotriazole, anhydrous
2.	General data		
2.1	Composition	:	100 % 1-hydroxybenzotriazole, anhydrous
2.2	Molecular formula	:	C ₆ H ₅ N ₃ O
2.3	Physical form	:	Fine crystalline powder
2.4	Colour	:	White to light beige
2.5	Apparent density	:	454 kg/m ³ , when crystalline
2.6	Particle size	:	not determined
3.	Box 2	:	Is the substance manufactured with the view to
			producing a practical explosive or pyrotechnic
			effect?
3.1	Answer	:	No
3.2	Exit	:	Go to Box 3
4.	Box 3	:	Test Series 1
4.1	Propagation of Detonation	:	UN test A.1
4.2	Sample conditions	:	Ambient temperature, 425 g
4.3	Observations	:	Fragmentation into 4 pieces, no substance
			remains
4.4	Result	:	"+", propagation of detonation
4.5	Effect of heating under		
	confinement	:	Koenen test (test 1(b))
4.6	Sample conditions	:	Mass 13 g
4.7	Observations	:	Limiting diameter 10.0 mm
			Fragmentation type "F" (time to reaction 12 s,
			duration of reaction 0 s)
4.8	Result	:	"+", shows some explosive effects on heating
			under confinement
4.9	Effect of ignition under		
	confinement	:	Time/pressure test (test $1(c)(i)$
4.10	Sample conditions	:	Ambient temperature
4.11	Observations	:	Time for a pressure rise from 690 to 2070 kPa
			< 0.5 ms!
4.12	Result	:	"+", propagation of deflagration
4.13	Exit	:	Go to box 4
5.	Box 4	:	Is it an explosive substance?
5.1	Answer from Test Series 1	:	Yes
5.2	Exit	:	Go to box 5
6.	Box 5	:	Test Series 2
6.1	Sensitivity to shock	:	BAM 1" steel tube test, standard detonator
	-		0.6 g PETN
6.2	Sample conditions	:	Ambient temperature, mass 63.5 g

6.3	Observations	:	No fragmentation, no substance remains, deflagration
6.4	Result	:	"-", not sensitive to shock
6.5	Effect of heating under		
	continement	:	Koenen test (test 2(b))
6.6	Sample conditions	:	Mass 13 g
6.7	Observations	:	Limiting diameter 10.0 mm
			Fragmentation type "F" (time to reaction 12 s,
			duration of reaction 0 s)
6.8	Result	:	"+", violent effect on heating under confinement
6.9	Effect of ignition under		
	confinement	:	Time/pressure test (test $2(c)(i)$
6 10	Sample conditions		Ambient temperature
6.11	Observations		Time for a pressure rise from 690 to 2070 kPa
0.11	observations	•	$\sim 0.5 \text{ ms}^{-1}$
612	Docult		< 0.5 ms: "+" propagation of deflagration
0.12 6.12	Kesun Exit	•	+, propagation of deflagration
0.13	Exit	:	Go to box 6
7.	Box 6	:	Is the substance too insensitive for acceptance
			into Class 1?
7.1	Answer from Test Series 2	:	No
7.2	Conclusion	:	Substance to be considered for Class 1 (box 8)
7.3	Exit	:	Go to box 9
	-		
8.	Box 9	:	Test Series 3
8. 8.1	Box 9 Thermal stability	:	Test Series 3 75 °C/48 hour test (test 3(c))
8. 8.1 8.2	Box 9 Thermal stability Remark	:	Test Series 3 75 °C/48 hour test (test 3(c)) Test not performed
8. 8.1 8.2 8.3	Box 9 Thermal stability Remark Observations	:	Test Series 3 75 °C/48 hour test (test 3(c)) Test not performed Melting point 158 °C (DSC 5 K/min):
8. 8.1 8.2 8.3	Box 9 Thermal stability Remark Observations	:	Test Series 3 75 °C/48 hour test (test 3(c)) Test not performed Melting point 158 °C (DSC, 5 K/min); decomposition above the melting point
 8. 8.1 8.2 8.3 8.4 	Box 9 Thermal stability Remark Observations	:	Test Series 3 75 °C/48 hour test (test 3(c)) Test not performed Melting point 158 °C (DSC, 5 K/min); decomposition above the melting point "-" thermally stable
 8. 8.1 8.2 8.3 8.4 8.5 	Box 9 Thermal stability Remark Observations Result Impact sensitivity	:	Test Series 3 75 °C/48 hour test (test 3(c)) Test not performed Melting point 158 °C (DSC, 5 K/min); decomposition above the melting point "-", thermally stable BAM fallhammer test (test 3(a)(ii))
 8. 8.1 8.2 8.3 8.4 8.5 8.6 	Box 9 Thermal stability Remark Observations Result Impact sensitivity Sample conditions	:	Test Series 3 75 °C/48 hour test (test 3(c)) Test not performed Melting point 158 °C (DSC, 5 K/min); decomposition above the melting point "-", thermally stable BAM fallhammer test (test 3(a)(ii)) as received
 8. 8.1 8.2 8.3 8.4 8.5 8.6 8.7 	Box 9 Thermal stability Remark Observations Result Impact sensitivity Sample conditions Observations		Test Series 3 75 °C/48 hour test (test 3(c)) Test not performed Melting point 158 °C (DSC, 5 K/min); decomposition above the melting point "-", thermally stable BAM fallhammer test (test 3(a)(ii)) as received
 8. 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8 	Box 9 Thermal stability Remark Observations Result Impact sensitivity Sample conditions Observations Bacult		Test Series 3 75 °C/48 hour test (test 3(c)) Test not performed Melting point 158 °C (DSC, 5 K/min); decomposition above the melting point "-", thermally stable BAM fallhammer test (test 3(a)(ii)) as received Limiting impact energy 10 J
 8. 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8 8.0 	Box 9 Thermal stability Remark Observations Result Impact sensitivity Sample conditions Observations Result Eriotion consitivity		Test Series 3 75 °C/48 hour test (test 3(c)) Test not performed Melting point 158 °C (DSC, 5 K/min); decomposition above the melting point "-", thermally stable BAM fallhammer test (test 3(a)(ii)) as received Limiting impact energy 10 J "-", not too dangerous to transport in form tested PAM frighter test (test 3(b)(i))
 8. 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8 8.9 8.10 	Box 9 Thermal stability Remark Observations Result Impact sensitivity Sample conditions Observations Result Friction sensitivity Sample conditions		Test Series 3 75 °C/48 hour test (test 3(c)) Test not performed Melting point 158 °C (DSC, 5 K/min); decomposition above the melting point "-", thermally stable BAM fallhammer test (test 3(a)(ii)) as received Limiting impact energy 10 J "-", not too dangerous to transport in form tested BAM friction test (test 3(b)(i))
 8. 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8 8.9 8.10 9.11 	Box 9 Thermal stability Remark Observations Result Impact sensitivity Sample conditions Observations Result Friction sensitivity Sample conditions		Test Series 3 75 °C/48 hour test (test 3(c)) Test not performed Melting point 158 °C (DSC, 5 K/min); decomposition above the melting point "-", thermally stable BAM fallhammer test (test 3(a)(ii)) as received Limiting impact energy 10 J "-", not too dangerous to transport in form tested BAM friction test (test 3(b)(i)) as received
 8. 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8 8.9 8.10 8.11 8.12 	Box 9 Thermal stability Remark Observations Result Impact sensitivity Sample conditions Observations Result Friction sensitivity Sample conditions Observations Deservations		Test Series 3 75 °C/48 hour test (test 3(c)) Test not performed Melting point 158 °C (DSC, 5 K/min); decomposition above the melting point "-", thermally stable BAM fallhammer test (test 3(a)(ii)) as received Limiting impact energy 10 J "-", not too dangerous to transport in form tested BAM friction test (test 3(b)(i)) as received Limiting load > 360 N
 8. 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8 8.9 8.10 8.11 8.12 	Box 9 Thermal stability Remark Observations Result Impact sensitivity Sample conditions Observations Result Friction sensitivity Sample conditions Observations Result Result		Test Series 3 75 °C/48 hour test (test 3(c)) Test not performed Melting point 158 °C (DSC, 5 K/min); decomposition above the melting point "-", thermally stable BAM fallhammer test (test 3(a)(ii)) as received Limiting impact energy 10 J "-", not too dangerous to transport in form tested BAM friction test (test 3(b)(i)) as received Limiting load > 360 N "-", not too dangerous to transport in form tested
 8. 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8 8.9 8.10 8.11 8.12 8.13 	Box 9 Thermal stability Remark Observations Result Impact sensitivity Sample conditions Observations Result Friction sensitivity Sample conditions Observations Result Friction sensitivity Sample conditions Observations Result Exit		Test Series 3 75 °C/48 hour test (test 3(c)) Test not performed Melting point 158 °C (DSC, 5 K/min); decomposition above the melting point "-", thermally stable BAM fallhammer test (test 3(a)(ii)) as received Limiting impact energy 10 J "-", not too dangerous to transport in form tested BAM friction test (test 3(b)(i)) as received Limiting load > 360 N "-", not too dangerous to transport in form tested Go to box 10
 8. 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8 8.9 8.10 8.11 8.12 8.13 9. 	Box 9 Thermal stability Remark Observations Result Impact sensitivity Sample conditions Observations Result Friction sensitivity Sample conditions Observations Result Exit Box 10		Test Series 3 75 °C/48 hour test (test 3(c)) Test not performed Melting point 158 °C (DSC, 5 K/min); decomposition above the melting point "-", thermally stable BAM fallhammer test (test 3(a)(ii)) as received Limiting impact energy 10 J "-", not too dangerous to transport in form tested BAM friction test (test 3(b)(i)) as received Limiting load > 360 N "-", not too dangerous to transport in form tested Go to box 10 Is the substance thermally stable?
 8. 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8 8.9 8.10 8.11 8.12 8.13 9. 9.1 	Box 9 Thermal stability Remark Observations Result Impact sensitivity Sample conditions Observations Result Friction sensitivity Sample conditions Observations Result Exit Box 10 Answer from test 3(c)		Test Series 3 75 °C/48 hour test (test 3(c)) Test not performed Melting point 158 °C (DSC, 5 K/min); decomposition above the melting point "-", thermally stable BAM fallhammer test (test 3(a)(ii)) as received Limiting impact energy 10 J "-", not too dangerous to transport in form tested BAM friction test (test 3(b)(i)) as received Limiting load > 360 N "-", not too dangerous to transport in form tested Go to box 10 Is the substance thermally stable? Yes
 8. 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8 8.9 8.10 8.11 8.12 8.13 9.1 9.2 	Box 9 Thermal stability Remark Observations Result Impact sensitivity Sample conditions Observations Result Friction sensitivity Sample conditions Observations Result Exit Box 10 Answer from test 3(c) Exit		Test Series 3 75 °C/48 hour test (test 3(c)) Test not performed Melting point 158 °C (DSC, 5 K/min); decomposition above the melting point "-", thermally stable BAM fallhammer test (test 3(a)(ii)) as received Limiting impact energy 10 J "-", not too dangerous to transport in form tested BAM friction test (test 3(b)(i)) as received Limiting load > 360 N "-", not too dangerous to transport in form tested Go to box 10 Is the substance thermally stable? Yes Go to box 11
 8. 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8 8.9 8.10 8.11 8.12 8.13 9. 9.1 9.2 10. 	Box 9 Thermal stability Remark Observations Result Impact sensitivity Sample conditions Observations Result Friction sensitivity Sample conditions Observations Result Exit Box 10 Answer from test 3(c) Exit Box 11		Test Series 3 75 °C/48 hour test (test 3(c)) Test not performed Melting point 158 °C (DSC, 5 K/min); decomposition above the melting point "-", thermally stable BAM fallhammer test (test 3(a)(ii)) as received Limiting impact energy 10 J "-", not too dangerous to transport in form tested BAM friction test (test 3(b)(i)) as received Limiting load > 360 N "-", not too dangerous to transport in form tested Go to box 10 Is the substance thermally stable? Yes Go to box 11 Is the substance too dangerous for transport in
 8. 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8 8.9 8.10 8.11 8.12 8.13 9. 9.1 9.2 10. 	Box 9 Thermal stability Remark Observations Result Impact sensitivity Sample conditions Observations Result Friction sensitivity Sample conditions Observations Result Exit Box 10 Answer from test 3(c) Exit Box 11		Test Series 3 75 °C/48 hour test (test 3(c)) Test not performed Melting point 158 °C (DSC, 5 K/min); decomposition above the melting point "-", thermally stable BAM fallhammer test (test 3(a)(ii)) as received Limiting impact energy 10 J "-", not too dangerous to transport in form tested BAM friction test (test 3(b)(i)) as received Limiting load > 360 N "-", not too dangerous to transport in form tested Go to box 10 Is the substance thermally stable? Yes Go to box 11 Is the substance too dangerous for transport in the form in which it was tested?
 8. 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8 8.9 8.10 8.11 8.12 8.13 9. 9.1 9.2 10. 10.1 	Box 9 Thermal stability Remark Observations Result Impact sensitivity Sample conditions Observations Result Friction sensitivity Sample conditions Observations Result Exit Box 10 Answer from test 3(c) Exit Box 11 Answer from Test Series 3		Test Series 3 75 °C/48 hour test (test 3(c)) Test not performed Melting point 158 °C (DSC, 5 K/min); decomposition above the melting point "-", thermally stable BAM fallhammer test (test 3(a)(ii)) as received Limiting impact energy 10 J "-", not too dangerous to transport in form tested BAM friction test (test 3(b)(i)) as received Limiting load > 360 N "-", not too dangerous to transport in form tested Go to box 10 Is the substance thermally stable? Yes Go to box 11 Is the substance too dangerous for transport in the form in which it was tested? No
 8. 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8 8.9 8.10 8.11 8.12 8.13 9. 9.1 9.2 10. 10.1 10.2 	Box 9 Thermal stability Remark Observations Result Impact sensitivity Sample conditions Observations Result Friction sensitivity Sample conditions Observations Result Exit Box 10 Answer from test 3(c) Exit Box 11 Answer from Test Series 3 Exit		Test Series 3 75 °C/48 hour test (test 3(c)) Test not performed Melting point 158 °C (DSC, 5 K/min); decomposition above the melting point "-", thermally stable BAM fallhammer test (test 3(a)(ii)) as received Limiting impact energy 10 J "-", not too dangerous to transport in form tested BAM friction test (test 3(b)(i)) as received Limiting load > 360 N "-", not too dangerous to transport in form tested Go to box 10 Is the substance thermally stable? Yes Go to box 11 Is the substance too dangerous for transport in the form in which it was tested? No Go to box 18

ST/SG/AC.10/C.3/2005/29 page 5 Annex 1

11.	Conclusion	:	PROVISIONALLY ACCEPT INTO CLASS 1
11.1	Exit	:	Apply the Class 1 assignment procedure

It should not be necessary to perform tests of Test Series 6 because the test results of Test Series 1 and 2 show the high sensitivity of the substance to shock, the violent effect of heating under confinement and the ability to propagate a deflagration very rapidly. In all probability, a single package test (test 6(a)) with an igniter leads to a mass explosion. Therefore, the substance 1-Hydroxybenzotriazole, anhydrous, should be a candidate of Division 1.1D.

Proposed assignment

.

Proper shipping name	:	1-Hydroxybenzotriazole, anhydrous
Class or Division	:	1.1D
UN number	:	XXXX
Concentration	:	100 %
Subsidiary Risks	:	(-)
Special Provisions	:	(-)
Packing Method	:	Packing instruction 112(c).
0		Special packing instruction PP48:
		For UNNos. 0504 and xxxx, metal packagings shall not be used

Annex 2 (English only)

Figure 1

DATA SHEET TO BE SUBMITTED TO THE UNITED NATIONS FOR NEW OR AMENDED CLASSIFICATION OF SUBSTANCES

Submitted by Germany

August 2005

Supply all relevant information, including sources of basic classification data. Data should relate to the product in the form to be transported. State test methods. Answer all questions - if necessary state "not known" or "not applicable" - If data is not available in the form requested, provide what is available with details. Delete inappropriate words.

Section 1. SUBSTANCE IDENTITY

1.1	Chemical name	1-Hydroxybenzotriazole	
1.2	Chemical formula	$C_6H_5N_3O$	N.N.N.
			∽ N ОН

1.3	Other names/synonyms	1-Hydroxy-1H-benzotriazole; 1-Hydroxybenzotriazole
		anhydrous; HOBt; N-Hydroxybenzotriazole; N-Hydroxy-
		1,2,3-benzotriazole; 1H-Benzotriazole, 1-hydroxy-

1.4.1 UN number 1.4.2 CAS number 2592-95-2

- 1.5 Proposed classification for the Recommendations
 - 1.5.1 proper shipping name (3.1.21) 1-Hydroxybenzotriazole, anhydrous (HOBt)
 - 1.5.2 class/division 1.1 D subsidiary risk(s) packing group
 - 1.5.3 proposed special provisions, if any
 - 1.5.4 proposed packing instruction(s) P112(c), PP48

Section 2. PHYSICAL PROPERTIES

- 2.1 Melting point or range 157-158 °C
- 2.2 Boiling point or range °C not applicable (n. a.)

¹ This and similar references are to chapters and paragraphs in the Model Regulations on the Transport of Dangerous Goods.

- 2.3 Relative density at :
 2.3.1 15 °C
 2.3.2 20 °C Apparent density about 454 kg/m³
 2.3.3 50 °C
- 2.4 Vapour pressure at : 2.4.1 50 °C n. a kPa 2.4.2 65 °C n. a kPa
- 2.5 Viscosity at 20 °C2 n. a m^2/s
- 2.6 Solubility in water at 20 °C < 1 mg/l
- 2.7 Physical state at 20°C (2.2.1.1¹) solid/ $\frac{1}{1000}$
- 2.8 Appearance at normal transport temperatures, including colour and odour crystalline powder; white to light beige; nearly odourless
- 2.9 Other relevant physical properties danger of deflagration and dust explosion

Section 3. FLAMMABILITY

- 3.1 Flammable vapour
 3.1.1 Flash point (2.3.3¹) n. a °C oc/cc
 3.1.2 Is combustion sustained? (2.3.1.3¹) yes/no
- 3.2 Autoignition temperature °C
- 3.3 Flammability range (LEL/UEL) %
- 3.4 Is the substance a flammable solid? $(2.4.2^1)$ yes/no
 - 3.4.1 If yes, give details

The substance propagates a deflagration very rapidly and shows therefore also the properties of a flammable solid but on the basis of the test results (see test report) this substance should be classified as an explosive substance of class 1

Section 4. CHEMICAL PROPERTIES

2

4.1 Does the substance require inhibition/stabilization or other treatment such as nitrogen blanket to prevent hazardous reactivity? yes/no If yes, state:
4.1.1 Inhibitor/stabilizer used .
4.1.2 Alternative method .
4.1.3 Time effective at 55 °C
4.1.4 Conditions rendering it ineffective

See definition of "liquid" in 1.2.1 of the Model Regulations on the Transport of Dangerous Goods.

ST/SG/AC.10/C.3/2005/29 page 8 Annex 2

4.2	Is the substance an explosive according to paragraph 2.1.1.1? (2.1^1) yes/ no 4.2.1 If yes, give details see Test Report					
4.3	Is the s 4.3.1	substance a desensitize If yes, give details	d explosive? (2.4	4.2.4 ¹) yes /no		
4.4	Is the s If yes,	ubstance a self-reactiv state:	e substance? (2.4	4.1 ¹) yes /no		
	4.4.1 e What i Is the t	xit box of flow chart s the self-accelerating emperature control rec	decomposition te puired? (2.4.2.3.4	emperature (SADT) fo ¹) yes/no	or a 50 kg package?	°C
	4.4.2	proposed control temp	perature for a 50	kg package	°C	
	4.4.3	proposed emergency	temperature for a	50 kg package	°C	
4.5	Is the s 4.5.1 If	substance pyrophoric? f yes, give details	(2.4.3 ¹) yes /no			
4.6	Is the s 4.6.1 If	substance liable to self- f yes, give details	heating? (2.4.31)) yes/no		
4.7	Is the s	substance an organic pe	eroxide (2.5.11) y	/es/no		
	If yes s 4.7.1 e	state: xit box of flow chart				
	What i	s the self accelerating	decomposition te	emperature (SADT) fo	or a 50 kg package?	°C
	Is temperature control required? (2.5.3.4.11) yes/no					
	4.7.2 proposed control temperature for a 50 kg package °C					
	4.7.3 proposed emergency temperature for a 50 kg package °C					
4.8	Does the substance in contact with water emit flammable gases? (2.4.41) yes/no					
	4.8.1 If yes, give details					
4.9	Does the substance have oxidizing properties (2.5.11) yes/no 4.9.1 If yes, give details					
4.10	Corros	ivity (2.81) to: no data	available, metal	packagings should no	ot be used	
	4.10.1	mild steel	mm/year at	°C		
	4.10.2	aluminium	mm/year at	°C		
	4.10.3	other packaging mate	rials (specify)	mm/year at	°C	
				mm/year at	°C	
4.11	Other 1	elevant chemical prop	erties			

ST/SG/AC.10/C.3/2005/29 page 9 Annex 2

Section 5. HARMFUL BIOLOGICAL EFFECTS

5.1 LD50, oral $(2.6.2.1.1^{1})$: > 2000 mg/kg, Animal species: rat

5.2	LD50, dermal (2.6.2.1.2 ¹): no data available	mg/kg, Anima	al species	
5.3	LC50, inhalation (2.6.2.1.3 ¹): no data available or	mg/litre ml/m3	Exposure time Animal species	hours
5.4	Saturated vapour concentration at 20 °C (2.6.2.2.4	4.3^1): no data a	available ml/m	3

- 5.5 Skin exposure (2.8¹) results: "mild" Exposure time hours/minutes 24 hours (500 mg) Animal species rabbit
- 5.6 Other data
- 5.7 Human experience

Section 6. SUPPLEMENTARY INFORMATION

- 6.1 Recommended emergency action
 - 6.1.1 Fire (include suitable and unsuitable extinguishing agents) compatible with all established extinguishing agents
 - 6.1.2 Spillage cover spilled substance with water
- 6.2 Is it proposed to transport the substance in:
 - 6.2.1 Bulk Containers (6.8^1) yes/no 6.2.2 Intermediate Bulk Containers (6.5^1) ? yes/no 6.2.3 Portable tanks (6.7^1) ? yes/no If yes, give details in Sections 7, 8 and/or 9.

Section 7. BULK CONTAINERS (only complete if yes in 6.2.1)

7.1 Proposed type(s)

Section 8. INTERMEDIATE BULK CONTAINERS (IBCs) (only complete if yes in 6.2.2)

8.1 Proposed type(s)

Section 9. MULTIMODAL TANK TRANSPORT (only complete if yes in 6.2.3)

- 9.1 Description of proposed tank (including IMO tank type if known)
- 9.2 Minimum test pressure
- 9.3 Minimum shell thickness
- 9.4 Details of bottom openings, if any
- 9.5 Pressure relief arrangements
- 9.6 Degree of filling
- 9.7 Unsuitable construction materials