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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

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

**LISTING, CLASSIFICATION AND PACKING**

Classification of magnesium nitrate hexahydrate

Submitted by the expert from South Africa

**Background**

Magnesium nitrate (UN 1474) is classified in the UN Model Regulations as an oxidizer of Division 5.1, Packing Group III.

Magnesium nitrate exists in multiple forms differentiated by the degree of hydration e.g. dihydrate, tetrahydrate and hexahydrate. Sasol Nitro in South Africa is a major manufacturer of magnesium nitrate hexahydrate and produces and exports about 25 % of the estimated world production of 20 kilo tonnes per year. The hexahydrate of magnesium nitrate is solely supplied to the agricultural sector where it is used in fertilizers and, principally, in fertigation (liquid fertilizers). See annex A for the Technical Data Sheet.

**Discussion**

The TNO Prins Maurits Laboratory in The Netherlands and the Fire Engineering Laboratory of the South African Bureau of Standards tested the magnesium nitrate hexahydrate in accordance with Test 0.1: *Test for oxidizing solids* of the UN *Manual of tests and criteria*. The results obtained are given in the table below.

Substance	Ratio	Mean burning time, s	
		TNO Prins Maurits Laboratory, The Netherlands	Fire Engineering Laboratory, SABS
Reference	3:7	116	60
	2:3	39	42
	3:2	8	18
Magnesium nitrate hexahydrate	1:1	>180 <sup>a</sup>	720
	4:1	>180 <sup>a</sup>	186
<sup>a</sup> No flames were observed, only yellow-brown smoke.			

According to the *Manual of tests and criteria*, any substance which, both in the 1:1 and the 4:1 specimen to cellulose ratio, by mass, exhibits mean burning times greater than that of a 3:7 mixture, by mass, of potassium bromate and cellulose, is not regarded an oxidizing substance of Division 5.1.

### Proposals

1. It is proposed that provision be made for the exception of magnesium nitrate hexahydrate from the Regulations on strength of the test data supplied.
2. It is proposed that either a new Special Provision XXX be added in column 6 against the entry for UN 1474 in the dangerous goods list:

“SP XXX If magnesium nitrate hexahydrate does not meet the established criteria of Division 5.1 when tested in accordance with Test 0.1 of the *Manual of tests and criteria*, it is not subject to these Regulations”, or

Special Provision 223 entered in column 6 against UN 1474.

**Annex****TECHNICAL DATA SHEET: MAGNESIUM NITRATE PRILLS**

<b>Trade name :</b>	Magnesium nitrate
<b>Common name:</b>	Magnesium nitrate prills
<b>Description:</b>	White to off- white uncoated solid hygroscopic crystals with an average particle diameter of about 0,6 mm consisting dominantly of water-soluble magnesium nitrate hexahydrate
<b>Molecular formula:</b>	$\text{Mg}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$
<b>CAS no:</b>	13446-18-9 (for hexa hydrate form of magnesium nitrate)
<b>Uses:</b>	Mainly in the manufacture of fertilizers
<b>Manufacturer:</b>	SASOL NITRO (Division of SASOL Chemical Industries) P.O. Box 2258 Sasolburg, 1947 South Africa

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Typical chemical and physical properties of Magnesium Nitrate Prills (hexa hydrate)

Magnesium nitrate $[\text{Mg}(\text{NO}_3)_2]$	58%	Tapped bulk density	1,1 g.cm <sup>-3</sup>
Molecular weight $[\text{Mg}(\text{NO}_3)_2]$	148,314	pH [10 % solution]	7
Molecular weight [hexa hydrate, $\text{Mg}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$ ]	256,406	Specific gravity (water =1)	1,46 g.cm <sup>-3</sup>
Calcium nitrate $[\text{Ca}(\text{NO}_3)_2]$	0,8%	Insoluble in water	0,12%
Ammonium nitrate $[\text{NH}_4\text{NO}_3]$	0,2%	Decompose (loose water)	~95 °C / 203 F