



SCIENTIFIC SUB-COMMITTEE

-
14th Session
-

42.203 E
(+ Annexes I to III)

O. Eng.

SC-3

Brussels, 14 January 1999.

PROPOSAL BY THE EC FOR AMENDMENT OF THE STRUCTURE
OF HEADING 25.19
(Item II.8 on Agenda)

Reference documents :

42.244 RSC/18
42.500 Annex B/7 (RSC/18 – Report)

I. BACKGROUND

1. The Review Sub-Committee at its 18th Session examined the following proposal from the EC for the separate identification of “fused magnesia” and “dead-burned (sintered) magnesia” in heading 25.19 :

25.19 Natural magnesium carbonate (magnesite); fused magnesia; dead-burned (sintered) magnesia, whether or not containing small quantities of other oxides added before sintering; other magnesium oxide, whether or not pure (unchanged)

2519.10 - Natural magnesium carbonate (magnesite) (unchanged)
2519.20 - Fused magnesia
2519.30 - Dead-burned (sintered) magnesia

2. The EC proposed to identify the products under new subheadings 2519.20 and 2519.30 mainly on the basis of the magnesium oxide content and specific weight. The technical specifications provided by the EC for the various magnesia products and the technical procedures suggested for identifying them are reproduced in Annexes I and II to this document, respectively.

File No. 2736

3. The Secretariat's examination of the EC proposal revealed the following points which indicated difficulties in finding appropriate criteria for distinguishing products of the proposed new subheadings (see Doc. 42.244, paragraphs 19-25) :
- (i) While the EC proposal assumed that the residual subheading 2519.90 covered only three types of magnesia, namely (1) fused magnesia, (2) dead burned (sintered) magnesia and (3) caustic-burned magnesia, the Secretariat considered that the residual subheading also included other types, such as light and heavy magnesium oxides (see page 205 of the Explanatory Notes) and hard burned magnesia (see paragraph 24 of Doc. 42.244).
 - (ii) The purity of the products in terms of weight percentage of magnesium oxide (MgO) (see Annex I) varied from 70 to 95% for caustic burned magnesia (subheading 2519.90), 85-96% for dead-burned magnesia (proposed subheading 2519.30) and 95-97.5% for fused magnesia (proposed subheading 2519.20). Higher percentages (> 98%) were indicated for synthetic products. In view of the close ranges of purity and their overlapping, the Secretariat expressed doubts about the reliability of this criterion for distinguishing products of the new subheadings.
 - (iii) The data provided by the EC had indicated (see Annex I, last column) that the specific weight (density) of natural or synthetic dead-burned magnesia (3 g/cm³ and 3.4 g/cm³, respectively) was lower than that of fused magnesia (minimum 3.5 g/cm³). Here also the range was very close and the Secretariat had expressed concerns about the practical aspects of using specific weight as a criterion for identification.
 - (iv) There were also references to "bulk density" (see Annex II). For dead-burned magnesia, it was indicated to be lower than 2 g/cm³. There seemed to be a conflict between the data given in Annex I and in Annex II.
 - (v) The EC had indicated that "fused magnesia" was easily recognisable with its larger crystal size (higher than 200 microns). However, there was no indication of crystal size of dead-burned (sintered) magnesia.
4. At the 18th Session of the Review Sub-Committee, the Delegate of the EC explained that the proposal was based on a request from the industry which distinguished the products. With regard to the questions raised by the Secretariat in Doc. 42.244, the clarification furnished by the industry association (EUROMETAUX) had been submitted to the Secretariat. Since "end use" or "manufacturing process" criterion would not be practical, the criteria suggested by the EC were essentially purity, specific weight and crystal size.
5. In view of the technical nature of the EC proposal, the Review Sub-Committee agreed that the matter be referred to the Scientific Sub-Committee for advice on the following questions :
- (a) criterion or criteria (e.g., density, surface area, crystal size, purity or any combination thereof) that could be applied to clearly distinguish between "fused magnesia" and "dead-burned (sintered) magnesia"; and between these two types and the residual products (caustic-burned magnesia and other magnesium oxides);
 - (b) the analytical methods which could be used to test these criteria.

II. INFORMATION SUBMITTED BY EUROMETAUX

6. The information and comments submitted by EUROMETAUX through the EC, as far as it relates to the questions under examination, are summarised below. The full text of the submission will be available for reference by delegates (File No. 2736).
- (i) EUROMETAUX agrees with the WCO Secretariat that the distinction criteria for the proposed subheadings should make it possible to distinguish between the new residual subheading (2519.90) and the proposed new subheadings (2519.20 and 2519.30), and also between the products of the new subheadings.
 - (ii) There was a mistake in Annex II with regard to bulk density of dead-burned magnesia. It should be “higher than 2 g/cm³” and not “lower than 2 g/cm³” . This explains conflict between the data given in Annex I and those in Annex II (see paragraph 3(iv) above).
 - (iii) It was not necessary to make a distinction between synthetic and natural magnesia for HS purposes;
 - (iv) The purity in itself cannot constitute a criterion for identifying the various types of magnesia. In this respect, a distinction should be made between the specific technical properties of magnesia products (Annex I) and the technical identification procedures for the various categories of magnesia (Annex II).
 - (v) The specific weight (bulk density) of fused magnesia and that of dead-burned magnesia are very similar and may not be suitable as a criterion to distinguish between these two categories of magnesia. On the other hand, the crystal size of these two types of magnesia is very distinct and could be used as a clear criterion : the crystal size of dead-burned magnesia is always less than 150 µm, whilst the crystal size of fused magnesia is always more than 200 µm.
 - (vi) The specific weight (bulk density) of both dead-burned magnesia and fused magnesia is **higher** than 2 g/cm³. This makes it possible to distinguish them from the residual category products (including caustic magnesia), which always has a specific weight (bulk density) of less than 1.5 g/cm³.
 - (vii) With regard to products other than caustic magnesia which are covered by the “residual category”, their specific weight (bulk density) is always less than 1.5 g/cm³. It is also stated that the industry as a whole considers all the products of the “residual category”, including those identified by the WCO as being “hard-burned magnesia”, as caustic magnesia.
 - (viii) The criteria suggested by the WCO in paragraph 24 of Doc. 42.244 from the technical literature [surface area and porosity of crystals] cannot make it possible to identify the various categories of magnesia in an exhaustive and “realistic” way.
7. In its conclusion, the EUROMETAUX stated that the criterion of specific weight (bulk density) makes it possible to distinguish both dead-burned and fused magnesia from the residual category products of subheading 2519.90. In order to distinguish between fused magnesia (subheading 2519.20), and dead-burned magnesia (subheading 2519.30), the criterion of crystal size should be used. EUROMETAUX also provided a modified table with the corrected figures in place of Annex II. This is reproduced at Annex III to this document.

III. SECRETARIAT COMMENTS

8. The criteria proposed by the EC for distinguishing between the proposed categories of magnesia were (1) purity, (2) specific weight (density) and (3) crystal size.

Purity (magnesium oxide content)

9. The Secretariat had already expressed the view that purity should not be used as a criterion for distinguishing between the proposed categories of magnesia products in view of their close range and overlapping (see paragraph 3 (ii) above).

10. EUROMETAUX shares the Secretariat's concerns in this regard and clarifies that it does not propose purity criteria for distinguishing between the magnesia products. It is explained that the purpose of the information put forward in Annex I was to show the technical properties of magnesia products, including the considerably different uses of these products.

Specific weight (Bulk density)

11. According to EUROMETAUX, the criterion of specific weight (bulk density) makes it possible to distinguish both dead-burned and fused magnesia (which have similar specific weight), from the residual category products of subheading 2519.90. They are reported to have a specific weight (bulk density) higher than 2 g/cm³, which makes it possible to distinguish them from the residual category (including caustic magnesia) products which always have a specific weight (bulk density) of less than 1.5 g/cm³.
12. The Secretariat has no objection to use specific weight (bulk density) as a criterion for the aforementioned purposes. However, according to Ullmann's Encyclopedia of Industrial Chemistry (Vol. A 15, pages 607, 612 and 619) hard burned caustic magnesia (proposed residual subheading 2519.90) has a bulk density of 2 g/cm³. Bulk density of sintered (dead-burned) magnesia (proposed subheading 2519.30) is usually in the range 3.25 – 3.45 g/cm³ and that of fused magnesia (proposed subheading 2519.20) is 3.50 g/cm³ or higher. The figure (less than 1.5 g/cm³) given by the EUROMETAUX for the bulk density of residual category (including caustic magnesia), therefore, seems to be in conflict with this information, especially regarding hard burned caustic magnesia. The Secretariat feels that it would be safer to say that the bulk density of the products of the residual category is lower than [2.5] g/cm³. The Sub-Committee is requested to express its views in this regard.

Crystal Size

13. This has been suggested as a criterion to distinguish between fused magnesia and dead-burned magnesia. According to EUROMETAUX, the crystal size of dead-burned magnesia is always less than 150 microns and that of fused magnesia always more than 200 microns (see paragraph 6 (v) above).

14. Kirk-Othmer Encyclopedia of Chemical Technology (Fourth Edition, Vol. 15, p. 704) indicates that :
- the crystal size of dead-burned magnesia is higher than 40 microns (but does not specify any upper limit);
 - fused magnesia has extremely large crystal size and may have crystals weighing 200 g or more (but does not give any lower limit in microns); and
 - hard-burned magnesia has a crystal size varying from 1 to 20 microns (residual category).
15. On the other hand, Ullmann's (page 616) indicates that the most commonly available grades of fused magnesia have a MgO content of > 92% and particle size of 0-400 μm . The Secretariat, therefore, is not in a position to confirm the figures given by EUROMETAUX for the crystal size of dead-burned (sintered) magnesia (less than 150 μm) and fused magnesia (more than 200 μm). The Sub-Committee is invited to take the above information into account while examining a possible crystal size criterion.

Other possible criteria

16. A table found in Kirk-Othmer (page 704) concerning typical production conditions and resulting properties of magnesias produced from magnesium hydroxide is reproduced below:

Magnesia	Calcination temperature, °C	Surface area m^2/g	Crystallite size μm	Porosity %
light-burned	<950	1-200	<0.5	70-80
hard-burned	1090-1650	0.1-1	1-20	40-50
dead-burned	>1800	<0.1	>40	0-5

17. This table suggests that, in addition to crystallite size, surface area and porosity might also be used as possible criteria for distinguishing between the proposed categories of magnesia, but such data are not available for fused magnesia. The Sub-Committee is invited to consider whether any of these criteria are suitable for the purpose of EC proposal.

Manufacturing Process

18. At the 18th Session of the Review Sub-Committee, certain delegates noted that the distinction between the proposed categories of magnesia could be possible by the method of manufacture. In this regard, the following information is given in Ullmann's Encyclopedia of Industrial Chemistry (Vol. A 15, pages 605 to 613 and 617) :
- Caustic magnesia is produced industrially by calcining lump magnesium carbonate or finer material at 600-1000 °C in shaft, rotary, or multiple-hearth (Herreshoff) kilns. Heat-exchange kilns are also employed. Caustic magnesia may be the end product of magnesia production or may be further burned to give sintered magnesia;

- (b) Sintered (dead-burned) magnesia is obtained from caustic magnesia briquettes by sintering at 1700 to > 2000 °C for 2-15 h (rotary kiln) or approximately 20 h (shaft kiln);
- (c) Fused magnesia is mainly produced in a batch process by melting (at 2800-3000 °C) naturally occurring magnesite that has been calcined at 1200 –1400 °C (“dead-burned”) or magnesite from seawater containing > 97% magnesium oxide.

19. The Secretariat considers that it would be virtually impossible to ascertain the process of manufacture by looking at the product in question at the port of importation. In addition, the Secretariat wishes to point out that, as mentioned in the Explanatory Note to heading 25.19, the second paragraph, item (2), small quantities of oxides are added to lower the sintering temperature and therefore the above-mentioned temperature ranges are not always valid. The Sub-Committee is requested to consider whether it is possible to use the method of manufacture as a criterion for identifying the above products.

III. CONCLUSION

20. The Sub-committee is invited to examine the questions posed by the Review Sub-Committee in paragraph 5 above, taking into account the information from the EC and EUROMETAUX and the Secretariat’s comments above. In particular, the Sub-Committee is invited to consider :

- (a) whether purity in terms of magnesium oxide (MgO) could be used as a criterion to identify the various products covered by the EC proposal;
- (b) whether specific weight (bulk density) could be used to distinguish both dead-burned magnesia and fused magnesia (proposed subheadings 2519.20 and 2519.30) from the residual category (proposed subheadings 2519.90) and, if so, what should be the line of demarcation of the specific weight (bulk density) between the two categories;
- (c) whether crystal size could be used as a criterion for distinguishing between dead-burned magnesia (proposed subheading 2519.30) and fused magnesia (proposed subheading 2519.20) and, if so, what should be the appropriate crystal size for making such a distinction; and
- (d) whether any other criteria such as surface area, porosity or manufacturing method could be used for distinguishing between the proposed categories of magnesia products.

21. Depending on its conclusions on the distinguishing criteria, the Sub-Committee is also requested to specify the test methods for each of these criteria.

x

x x

TECHNICAL SPECIFICATIONS OF MAGNESIA PRODUCTS

Product	Manufacture process	Quality	Uses	Specific weight
Caustic burned magnesia of natural origin	Calcination (at 800-1200°C) of natural magnesium carbonate	70-95% MgO	Animal feedstuffs and fertilisers, Sorel cement and insulating panels, chemicals, abrasives, pulp, environment (water and gas treatment)	1 g/cm ³
Dead-burned magnesia (natural)	Sintering (at 1500-1800°C) of natural magnesium carbonate	85-96% MgO	Refractories, welding flux, magnesium metal	3 g/cm ³
Synthetic caustic burned magnesia	Calcination of magnesium hydroxide precipitated from sea-water or brine	>98% MgO (price structure higher than that of natural caustic burned magnesia)	Pharmaceuticals , fine chemicals	0.6 - 1.2g/cm ³
Synthetic dead-burned magnesia	Sintering at high temperature (1800-1950°C) of synthetic dead-burned magnesia briquettes	>98% MgO (price structure higher than that of natural dead-burned magnesia)	Refractories (top of the range)	3.4 g/cm ³
Fused magnesia	Very high temperature smelting (3000°C) of caustic or dead-burned magnesia of natural or synthetic origin	95-97.5% MgO	Refractories (high-temperatures furnaces), Electric resistances	min. 3.5 g/cm ³ (1)

x

x x

(1) Easily recognisable, these being large crystals

Annexe / Annex II

**MODALITES TECHNIQUES D'IDENTIFICATION DES DIFFERENTES
 CATEGORIES DE MAGNESIE DANS LE SH**

**TECHNICAL PROCEDURES FOR IDENTIFYING THE
 VARIOUS CATEGORIES OF MAGNESIA IN THE HS**

Carbonate de magnésium naturel (magnésite) Natural magnesium carbonate (magnesite)	Perte au feu supérieure à 40 % Loss on ignition higher than 40 %
Magnésie calcinée caustique Caustic burned magnesia	Poids spécifique inférieur à 1.5 g/cm ³ Bulk density lower than 1.5 g/cm ³
Magnésie calcinée à mort Dead-burned magnesia	Poids spécifique inférieur à 2 g/cm ³ Bulk density lower than 2 g/cm ³
Magnésie électrofondue Fused magnesia	Taille des cristaux supérieure à 200 microns Crystal size higher than 200 microns

x

x x

Annexe / Annex III

(TITRE FRANCAIS)

REVISED DATA FROM EUROMETAUX

Carbonate de magnésium naturel (magnésite) Natural magnesium carbonate (magnesite)	Perte au feu supérieure à 40 % Loss on ignition higher than 40 %
Magnésie calcinée caustique et autres Caustic burned magnesia and others	Poids spécifique inférieur à 1.5 g/cm ³ Bulk density lower than 1.5 g/cm ³
Magnésie calcinée à mort et Magnésie électrofondue Dead-burned magnesia and fused magnesia	Poids spécifique supérieur à 2 g/cm ³ Bulk density higher than 2 g/cm ³
Magnésie calcinée à mort Dead-burned magnesia	Taille des cristaux inférieure à 150 microns Crystal size lower than 150 microns
Magnésie électrofondue Fused magnesia	Taille des cristaux supérieure à 200 microns Crystal size higher than 200 microns