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**Datasheet for the decision
of 4 October 2010**

Case Number: T 0913/07 - 3.3.01

Application Number: 97930895.4

Publication Number: 0929531

IPC: C07D 251/60

Language of the proceedings: EN

Title of invention:

Method for the preparation of melamine

Patentee:

DSM IP Assets B.V.

Opponent:

Agrolinz Melamin GmbH

Headword:

Melamine production/DSM

Relevant legal provisions:

EPC Art. 54

Relevant legal provisions (EPC 1973):

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Keyword:

"Main request - novelty (yes) - process step neither
explicitly nor implicitly disclosed"

"Remittal to the department of first instance"

Decisions cited:

T 0003/90, T 0696/02, T 1027/03, T 0198/84, T 0669/89

Catchword:

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Case Number: T 0913/07 - 3.3.01

D E C I S I O N
of the Technical Board of Appeal 3.3.01
of 4 October 2010

Appellant: DSM IP Assets B.V.
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 2 April 2007
revoking European patent No. 0929531 pursuant
to Article 102(1) EPC (1973).

Composition of the Board:

Chairman: P. Ranguis
Members: G. Seufert
C.-P. Brandt

Summary of Facts and Submissions

I. The Appellant (Patent Proprietor) lodged an appeal on 1 June 2007 against the decision of the Opposition Division dated 2 April 2007 revoking European patent No. 929 531 and filed a written statement on 8 August 2007 setting out the grounds of appeal.

II. The patent was granted on the basis of 11 claims, independent claim 1 reading as follows:

"A method of preparing highly pure solid melamine from urea melt, the method comprising the combination of steps of:

- a) introducing urea melt and off-gases comprising CO₂ NH₃ and melamine vapour into a scrubber unit at a pressure of 5 MPa to 25 MPa and a temperature of 170°C to 240°C whereby said melamine vapour is dissolved in said urea melt;
- (b) transferring said urea melt comprising said melamine as a urea melt mixture from said scrubber unit to a melamine reactor and heating said urea melt mixture in said melamine reactor to a temperature of 325°C to 450°C and a pressure of 5 MPa to 25 MPa sufficient to convert said urea melt mixture to a melamine melt and off-gases;
- (c1) separating said off-gases from said melamine melt and
- (c2) transferring said melamine melt to a first cooling vessel, the pressure in the cooling vessel being higher than 5 MPa and cooling the melamine melt to a temperature between 1°C to 30°C above the melting point of melamine;

(d) transferring said liquid melamine to a second cooling vessel in order to convert the liquid melamine to a solid product, wherein in the second cooling vessel melamine is further cooled using cold ammonia, to produce a pure solid melamine."

III. In this decision the following numbering will be used to refer to the documents:

- (1) WO 97/47609
- (3) Diagram provided by the Respondent reflecting the melting point of melamine plus 1°C and plus 30°C at pressures between 5 MPa and 25 MPa
- (3a) Diagram provided by the Appellant reflecting the melting point of melamine plus 1°C and plus 30°C at pressures between 5 MPa and 25 MPa

IV. Opposition was filed by the Respondent (Opponent) requesting revocation of the patent in suit in its entirety on the grounds of lack of novelty and inventive step (Article 100(a) EPC).

V. The Opposition Division held that the subject-matter of claim 1 of the patent in suit lacked novelty over the disclosure of document (1) in view of the fact that the temperature and pressure ranges of step (c2) of the disputed patent overlapped with those in the aging step of document (1).

VI. With the statement setting out the grounds of appeal the Appellant filed a first to fourth auxiliary request as well as additional experimental evidence. The first auxiliary request was replaced by a corrected first auxiliary request with letter of 13 August 2007.

VII. Both parties requested oral proceedings on an auxiliary basis. In a communication accompanying the summons to oral proceedings, the Board expressed its preliminary view on novelty. In particular, the Board indicated that the aging step of document (1) would not appear to be equivalent to the cooling step (c2) of the contested patent and that the technical feature "cooling to a temperature between 1°C to 30°C above the melting point of melamine" would not appear to be clearly derivable from document (1).

VIII. In reply to the summons the Respondent informed the Board with letter of 22 April 2010 that neither the Respondent nor its representative would be present at the oral proceedings.

IX. With fax of 11 May 2010 the oral proceedings scheduled for 28 May 2010 were cancelled by the Board.

X. The arguments of the Appellant to the extent that they are relevant for this decision can be summarised as follows:

The process according to the patent in suit was novel over the disclosure of document (1), because the aging step according to that document was not equivalent to step (c2) of the patent in suit. The alleged overlap, on which the Opposition Division had based its finding of lack of novelty, was an overlap of the final state of the melamine melt with respect to temperature and pressure between the aging step of document (1) and step (c2). For assessing novelty of the claimed process it was, however, necessary to consider not only the

final state of the melamine melt but also how this final state had been achieved. Document (1) did not explicitly disclose the cooling of the melamine melt in the aging step. Furthermore, it did not explicitly disclose the feature of the temperature being between 1°C and 30°C above the melting point of melamine in the aging step. The latter required a specific relationship between temperature and pressure, which was not derivable from document (1). There was also no implicit disclosure of cooling the melamine melt to the claimed temperature, in view of the fact that there was no clear disclosure of a specific point of pressure and a specific temperature drop within the aging vessel which resulted in an end temperature between 1°C and 30°C above the melting point of melamine.

XI. The arguments of the Respondent to the extent that they are relevant for this decision can be summarised as follows:

The subject-matter of the patent in suit was anticipated by document (1), particularly by the second embodiment. Step (c2) of the disputed patent reflected physical conditions which, although in a different wording, were encompassed by the aging step of document (1). In support, document (3) was provided, which showed an area of overlap in the temperature and pressure ranges between the aging step of document (1) and step (c2) of the disputed patent. Since this different wording resulted nevertheless in the same physical conditions, feature (c2) was inevitably achieved when realising the process of document (1). Moreover, for the skilled person the term "aging" included, as a matter of principle, the cooling of the

melamine melt, particularly due to natural loss of heat. Keeping the aging step under the same conditions as the reaction step was only a preferred option in document (1) and explicit references as to the cooling of the melamine melt were to be found on various pages of document (1).

XII. The Appellant requested that the decision under appeal be set aside and that the case be remitted to the first instance to decide on inventive step on the basis of the claims as granted, or that the case be remitted to the first instance on the basis of the first to fourth auxiliary requests.

XIII. The Respondent requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

2. *Procedural matters - Oral proceedings*

2.1 Both parties requested oral proceedings as an auxiliary measure (point VII above). In response to the summons to oral proceedings and to the Board's communication accompanying the summons in which it expressed its preliminary view indicating that it was likely to decide in the Appellant's favour, the Respondent informed the Board that neither the Respondent nor its representative would be present at the oral proceedings. No further submissions in reply to the preliminary opinion of the Board were filed.

2.2 In accordance with the established jurisprudence of the Boards of Appeal, the Board interpreted the Respondent's declaration as withdrawal of its previous auxiliary request for oral proceedings (T 3/90, OJ EPO 1992, 737; T 696/02; T 1027/03). In these circumstances the Board found it appropriate to cancel the oral proceedings.

Main request

3. *Novelty*

3.1 The Respondent contested the novelty of the subject-matter of the patent in suit in view of the disclosure in document (1), which qualifies as state of the art within the meaning of Article 54(3) EPC for all designated states. In particular, the Respondent challenged novelty in view of the second embodiment of document (1), which includes an aging step.

3.2 Document (1) discloses, in a second embodiment (claim 10), a process for the preparation of highly purified solid melamine from urea melt comprising the steps of

- (1) providing urea melt to a scrubber unit;
- (2) transferring said urea melt from said scrubber unit to a melamine reactor;
- (3) heating and pressurising said urea melt in said melamine reactor to a first temperature and a first pressure sufficient to produce a melamine melt and off-gases, said melamine melt comprising liquid melamine, melamine by-products and the off-gases comprising CO₂, NH₃ and melamine vapour;

- (4) exhausting said off-gases to said scrubber unit where said urea melt washes said melamine vapour out of said off-gases to form recovered liquid melamine, said off-gases then being exhausted out of the scrubber unit and said liquid melamine being returned to said melamine reactor;
- (5) transferring said liquid melamine to an aging vessel; said aging vessel containing said liquid melamine and ammonia for ten minutes to two hours;
- (6) transferring said liquid melamine to a cooling vessel, said cooling vessel being under a second temperature and a second pressure, said second temperature and said second pressure being equal to said first temperature and said first pressure;
- (7) exposing said melamine in said cooling vessel to ammonia for a period of time sufficient to convert said melamine by-products to melamine;
- (8) transferring said melamine to an expansion vessel and expanding said melamine by lowering the pressure in said expansion vessel to atmospheric pressure to produce a product of highly pure solid melamine.

The temperature and pressure in the scrubber unit are in the range of 170°C to 240°C and 5 to 25 MPa (document (1), page 9, lines 17-19, page 8, line 35 - page 9, line 1). In the melamine reactor the temperature and pressure are the range of 325°C to 450°C and 5 to 25 MPa (document (1), page 11, lines 25-27 and 31-33). In the cooling vessel the liquid melamine melt is cooled to between 50°C and 350°C (page 12, lines 23-32).

The general temperature and pressure ranges for the aging vessel are identical to the general temperature and pressure ranges of the reaction vessel, namely 325°C to 450°C and 5 to 25 MPa (document (1), page 11, lines 20-22). Furthermore, on page 11, lines 23-25 of document (1), it is mentioned that "preferably, the temperature and pressure in the aging vessel are virtually the same as in the reactor". In contrast to this disclosure, document (1) refers on page 6 to an aging step where the aging vessel is at the temperature and pressure of the scrubber unit.

Document (1) does not explicitly disclose the feature "cooling the melamine melt mixture to a temperature between 1°C to 30°C above the melting point" required in the first cooling step (c2) of the patent in suit. The only example of document (1) reflects the **first** embodiment which has no aging step and describes the transfer of the melamine melt from the reactor to a cooling vessel and the exposure to ammonia, whereby a **powdery** mixture of melamine and ammonia is formed. The temperature and pressure in the cooling vessel are kept are 175°C and 8 MPa. Thereafter the mixture is expanded.

3.3 According to the Respondent, step (c2) of the patent in suit is implicitly disclosed by the aging step of the second embodiment of document (1). In support of its contention, the Respondent provided document (3).

3.3.1 Document (3) is a diagram indicating on the X-axis a pressure range of 5 MPa to 25 MPa and on the Y-axis a temperature range of 300°C to 380°C. The shaded area between the temperatures of 325°C and 380°C at pressures from 5 to 25 MPa reflects, at least in part, the

conditions described in document (1) for the aging step. On this diagram two straight lines are plotted representing the melamine melting point plus 1°C (lower line) and the melamine melting point plus 30°C (upper line) at pressures between 5 and 25 MPa. The lines are the result of calculations using the established physical correlation between the pressure above the melt and the melamine melting point, a correlation which according to the Respondent forms part of the general knowledge of the skilled person working in the field of melamine production. The area between the two lines corresponds to the target area for the temperature in carrying out step (c2) of the patent in suit.

It has not been contested that the correlation between the pressure above the melamine melt and the melamine melting point belongs to the general knowledge of the skilled person, and the Appellant provided, as the result of its own calculations, a set of straight lines which slightly deviated from those presented by the Respondent (document (3a)). The reason for this deviation could not be explained. However, since the exact position of these lines played no decisive role in the outcome of the decision, the Board sees no need to examine the reasons for the deviation.

- 3.3.2 The Respondent argued that a comparison of the target area with the shaded area clearly showed that a major part of the target area of step (c2) is encompassed by the area disclosed in document (1). It pointed to fact that up to a pressure of about 17 MPa the required temperature range of the step (c2) is entirely encompassed by the temperature range for the aging step

disclosed in document (1). Only above that pressure is it possible to realise a temperature of 1°C above the melting temperature that lies below the value of 325°C and thus outside the disclosed area of document (1). Values close to the upper limit of the claimed range, i.e. 30°C above the melamine melting temperature, and below 325°C can only be achieved at a pressure well above 25 MPa.

Thus, according to the Respondent document (3) shows that step (c2) of the patent in suit and the aging step of document (1) result in the same physical conditions and therefore reflect the same activity in a different wording. Consequently, step (c2) is inevitably achieved when realising the process according to document (1).

3.3.3 The Respondent further argued that in these circumstances it is immaterial whether the required parameter ranges of step (c2) of the disputed patent are obtained by "cooling" or "aging". In its opinion the expression "aging" has to be understood as a "maturing" step, which includes cooling by natural loss of heat. Carrying out the aging step at the same temperature as the reaction step is merely a preferred embodiment of document (1). The possibility of cooling is thus readily apparent to the skilled reader. Furthermore, an aging step whereby the melamine mixture is cooled is explicitly disclosed on page 5, line 34 to page 6, line 2, page 10, lines 22-30, as well as on page 6, lines 22 to 30, of document (1). The latter describes that the aging vessel is at the temperature of the scrubber unit. The temperature range for the scrubber unit of document (1) is 170°C to 240°C compared with 325°C to 450°C in the reactor. Consequently, the

melamine melt is cooled in the aging step. The possibility of increasing the temperature during the aging step is not taught in document (1) and would technically not make any sense either.

3.4 The Board is not convinced by the Respondent's arguments.

3.4.1 Step (c2) of the patent in suit clearly requires that "the melamine melt is **cooled** to a **temperature between 1°C and 30°C above the melting point of melamine**" before it is further cooled in step (d) to produce solid melamine.

3.4.2 The term "cooling" as it is commonly understood refers to the act of decreasing the temperature of a substance from a higher value to a lower value. In the present case this term can only be understood as lowering the temperature from a (higher) reaction temperature in step (b) to a (lower) temperature within the range required in step (c2). In contrast, the term "aging" merely refers to the act of keeping a substance/product for a certain time. This includes the possibility of keeping the product at its initial temperature as well as the possibility of lowering or raising the temperature. The term "cooling" and "aging" can therefore not be equated unless there is a clear indication to this effect. The only clear teaching in document (1) with regard the aging step is to carry it out at the same temperature and pressure as the reaction step.

3.4.3 The statement on page 5, line 34, to page 6, line 2, of document (1) which, according to the Respondent,

demonstrates an aging step whereby the melamine mixture is cooled, describes the cooling steps (5) and (6) of the **first** embodiment, which does not contain an aging step. These cooling steps are identical to the cooling steps (7) and (8) of the second embodiment performed **after** the aging step and to the cooling step (d) of the process of the patent in suit. The statement on page 10, lines 22-30, refers to the temperature in the cooling vessel and is therefore also concerned with the temperature in the step after the aging step (cf. document (1): steps (5) and (6) of claim 10 or steps (6) and (7) on page 6). These statements cannot therefore serve as evidence that the aging step itself is performed under cooling conditions. The third statement in document (1), on which the Respondent relied as evidence for an explicit cooling, describes the temperature in the aging vessel as being the same as the temperature in the scrubbing unit. In view of the fact that the only temperature mentioned in document (1) in the context of the scrubber unit is between 170°C and 240°C (page 9, lines 17-19), this statement may at first glance appear to indicate an aging step, whereby the melamine mixture is cooled. However, the Board notes that this passage is in clear contradiction with the detailed description of the aging step on page 11 of document (1), which describes the temperature and pressure ranges in the aging step as being the same as in the reactor. Notwithstanding this contradiction, applying a temperature of 170°C to 240°C in the aging step will not cool the melamine mixture to a temperature above the melting point of melamine as required by step (c2) (see point 3.4.6 below).

Concerning the Respondent's arguments as to a temperature increase in the aging step of document (1), the Board notes that the term "aging" is not associated with a particular temperature and generally includes the possibility that the temperature may be increased (point 3.4.2 above). Furthermore, the Respondent had not provided any explanation or evidence, that could plausibly support his assertion that raising the temperature in the aging step of document (1) would technically not make any sense. In the absence of any explanation or evidence, the Respondent's argument is mere speculation and cannot be accepted.

- 3.4.4 Nor can document (3) serve as evidence that the aging step of document (1) is equivalent to the required cooling of the melamine melt according to step (c2) of the patent in suit, nor that the skilled person when practising the invention according to document (1) will inevitably arrive at a temperature within the area of step (c2) of the patent in suit.

The shaded area in the diagram of document (3) reflects part of the temperature and pressure ranges generally disclosed in document (1) for the aging step, which happen to be the same as those generally mentioned for the reaction step in document (1). The diagram does not however provide any information regarding the temperature relationship between the aging and the reaction step. Thus, no conclusion can be drawn from this diagram as to whether or not the aging step is carried out under cooling. Furthermore, the area between the two straight lines plotted on the diagram of document (3) reflects the final state with respect to temperature and pressure of the melamine melt as the

result of a cooling act. The fact that this final state was shown in document (3) to overlap under certain conditions with the state of the melamine melt as a result of an aging step according to document (1) does not mean that both steps employed to arrive at this state are inevitably identical and merely reflect the same activity in different words. On the contrary, as mentioned above (point 3.4.2), the terms "cooling" and "aging" refer to different activities.

- 3.4.5 Furthermore, even if, in the Respondent's favour, it is assumed that document (1) suggests cooling the melamine melt during the aging step, there is no disclosure in that document that this step should be carried out in such a way as to arrive at the target area according to step (c2) of the patent in suit. As can be seen from document (3), the cooling of the melamine melt according to step (c2) of the disputed patent requires a specific correlation between the temperature and pressure; for a specific pressure there are specific limits within which the temperature can be selected and *vice versa*. Document (1) is entirely silent on such a correlation; on the contrary, the Board concurs with the Appellant that the temperature and pressure can be "freely and independently selected within the general laws of physics". Thus, a wide range of cooling regimes could be adopted which do not necessarily fulfil the requirement that the melamine melt is cooled to a temperature between 1°C and 30°C above the melting point of melamine; in other words, the melamine melt could be cooled from the (higher) reaction temperature to any point either within or outside the area between the two straight lines of document (3). It is however not sufficient for finding lack of novelty of a claimed

feature that such a feature could have been derived from a prior art document. There must have been a clear and unmistakable teaching of such a feature.

3.4.6 The only indication in document (1) as to the cooling of the melamine melt in the aging step can be found on page 6, lines 27-30, which refers to the aging vessel being at the same temperature and pressure as the scrubber unit, i.e. at a temperature between 170°C and 240°C. As set out above (point 3.4.3), this teaching is inconsistent with the detailed description of the aging step on page 11 of document (1), which describes the temperature and pressure in the aging step as virtually the same as in the reactor, i.e. between 325°C and 350°C. Notwithstanding this inconsistency, it is also apparent from document (3) that a temperature of 170°C and 240°C at pressures of 5 to 25 MPa is well below the melting point of melamine and therefore lies clearly outside the target area of step (c2) of the patent in suit.

3.5 Following from the above, the Board concludes that the feature "cooling of the melamine melt to a temperature between 1°C and 30°C above the melting point of melamine" has neither explicitly nor implicitly been made available to the public by document (1).

With regard to this conclusion, the Respondent's arguments as to the absence of a particular technical effect within the claimed area are of no relevance. Such a particular effect is neither a prerequisite for, nor can it as such confer, novelty; its existence can merely serve to confirm a finding of novelty already

made (T 198/84, point 7 of the reasons; T 666/89, point 8 of the reasons, neither published in OJ EPO).

3.6 Consequently, the subject-matter of claim of the patent in suit is novel within the meaning of Article 54 EPC.

4. *Remittal*

In the decision under appeal the first instance revoked the patent solely on the ground of lack of novelty. The issue of inventive step had not yet been examined. Furthermore, the Appellant requested that the case be remitted to the first instance for assessment of inventive step. In these circumstances the Board considers it appropriate to exercise the power conferred on it by Article 111(1) EPC to remit the case to the Opposition Division for further prosecution.

First to fourth auxiliary requests

5. In view of the fact that the main request has been considered as novel and that the Board has decided to remit the case to the first instance for further prosecution, there is no need to decide on these requests.

Order

For these reasons it is decided that:

1. The decision is set aside.

2. The case is remitted to the department of first instance for further prosecution upon the basis of the main request.

The Registrar:

The Chairman:

M. Schalow

P. Ranguis