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Datasheet for the decision of 29 November 2007

Case Number: T 0881/05 - 3.3.03

Application Number: 96905815.5

Publication Number: 0812337

IPC: C08G 63/78

Language of the proceedings: EN

Title of invention:
Byproduct stream purification in the preparation of 1,3-propanediol-based polyesters

Patentee:
SHELL INTERNATIONALE RESEARCH MAATSCHAPPIJ B.V.

Opponent:
E.I. Du Pont de Nemours & Company, Inc.

Headword:
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Relevant legal provisions:
-

Relevant legal provisions (EPC 1973):
EPC Art. 56

Keyword:
"Inventive step (no)"

Decisions cited:
T 0069/83, T 0560/89

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0881/05 - 3.3.03

D E C I S I O N
of the Technical Board of Appeal 3.3.03
of 29 November 2007

Appellant: (Opponent)
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Decision under appeal:
Interlocutory decision of the Opposition Division of the European Patent Office dated 25 January 2005 and posted 2 May 2005 concerning maintenance of European patent No. 0812337 in amended form.

Composition of the Board:

Chairman: R. Young
Members: C. Idez
E. Dufrasne

Summary of Facts and Submissions

I. The grant of the European patent No. 0 812 337 in the name of Shell Internationale Research Maatschappij B.V in respect of European patent application No. 96 905 815.5 filed on 26 February 1996 and claiming priority of the US patent application No. 395231 filed on 27 February 1995 was announced on 16 December 1998 (Bulletin 1998/51) on the basis of 8 claims.

Claim 1 read as follows:

"A process in which at least one dicarboxylic acid and 1,3-prepanediol [sic] are contacted at elevated temperature to produce an aqueous product mixture comprising a
1,3-propanediol-based polyester and an aqueous solution of acrolein which comprises:
(a) removing a major portion of said aqueous solution from said aqueous product mixture;
(b) adding to the aqueous solution an amount of a base effective to form a basic solution having a pH greater than 7.5; and
(c) maintaining the basic solution for a time effective to reduce the amount of acrolein therein."

Claims 2 to 8 were dependent claims.

II. On 14 September 1999, a Notice of Opposition was filed against the patent by E.I. Du Pont de Nemours & Company, Inc., in which revocation of the patent in its entirety was requested on the ground of lack of inventive step (Article 100(a) EPC), on the ground of insufficiency of disclosure (Article 100(b) EPC), and on the ground of

extension of subject-matter (Article 100(c) EPC). The grounds of opposition under Article 100(b) and 100(c) EPC were however withdrawn by the Opponent with its letter dated 21 December 2000.

The following documents were *inter alia* considered in the opposition proceedings:

D2: "Kirk-Othmer Encyclopedia of Chemical Technology", Third Edition, John Wiley & Sons, Inc. 1978; Volume 1, page 290;

D3: US-A-3 923 648, and

D6: EP-A-0 547 553.

III. By an interlocutory decision announced orally on 25 January 2005 and issued in writing on 2 May 2005, the Opposition Division held that the grounds of opposition did not prejudice the maintenance of the patent in amended form.

The decision of the Opposition Division was based on Claims 1 to 8 submitted as main request with letter dated 27 April 2000, and on Claims 1 to 7 submitted as auxiliary request with letter dated 27 April 2000.

Claim 1 of the main request read as follows:

"A process in which at least one dicarboxylic acid and 1,3-propanediol are contacted at elevated temperature to produce an aqueous product mixture comprising a 1,3-propanediol-based polyester and an aqueous solution of acrolein which comprises:

(a) removing a major portion of said aqueous solution from said aqueous product mixture;
(b) adding to the aqueous solution an amount of a base effective to form a basic solution having a pH greater than 7.5; and
(c) maintaining the basic solution for a time effective to reduce the amount of acrolein therein; and
(d) subjecting the basic solution to biological treatment."

Claims 2 to 8 were dependent claims.

Claim 1 of the auxiliary request read as follows:
"A process in which at least one dicarboxylic acid and 1,3-propanediol are contacted at elevated temperature to produce an aqueous product mixture comprising a 1,3-propanediol-based polyester and an aqueous solution of acrolein which comprises:
(a) removing a major portion of said aqueous solution from said aqueous product mixture;
(b) adding to the aqueous solution an amount of a base effective to form a basic solution having a pH greater than 7.5;
(c) maintaining the basic solution for a time effective to reduce the amount of acrolein therein;
(d) adding an aqueous liquid to the basic solution to form a dilute solution containing less than 3 ppm acrolein; and
(e) subjecting the dilute basic solution to biological treatment.".

Dependent Claims 2 to 6 and 7 corresponded to granted Claims 2 to 6 and 8, respectively.

According to the decision of the Opposition Division, the subject-matter of Claim 1 of the main request lacked inventive step in view of document D3, starting from document D6 as closest state of the art.
The subject-matter of the auxiliary request was considered as novel. The subject-matter of this request was also considered as inventive since, according to the decision, there was no incentive in D3 or in the other documents cited to use a diluting step in order to reduce the amount of acrolein in the waste water to less than 3 ppm. Furthermore, according to the decision, Examples 7 and Table 5 of the patent in suit demonstrated the criticality of the value 3 ppm for the subsequent biological treatment.

IV. Notice of Appeal was filed on 7 July 2005 by the Appellant (Opponent), with simultaneous payment of the prescribed fee.

In the Statement of Grounds of Appeal filed on 9 September 2005, the Appellant submitted that D3 should be considered as the closest state of the art. Starting from D3, it was argued that adding a further dilution step could not render the claimed process inventive. Furthermore, the Appellant submitted that this dilution step was superfluous in view of the results obtained in D3. The Appellant further contested the criticality of the level of less than 3 ppm for acrolein.

V. In its letter dated 30 March 2006, the Respondent presented its counterarguments. It submitted that D3 could not be considered as the closest state of the art. It also underlined the criticality of the level of less than 3 ppm of acrolein for the biological treatment. It

hence requested that the appeal be dismissed and that the patent be maintained in the form allowed by the Opposition Division.

VI. With its letter dated 24 August 2006, the Appellant maintained its position that the subject-matter of the claims on which the Opposition Division intended to maintain the patent lacked inventive step in view of D3.

VII. A communication was issued by the Board on 26 March 2007, in which the Board made preliminary observations concerning inventive step of the subject-matter of Claim 1 of the set of Claims on the basis of which the Opposition Division intended to maintain the patent in suit, and concerning the criticality of the 3 ppm level of acrolein in particular in view of document D2.

VIII. With its letter dated 17 July 2007, the Respondent informed the Board that it would not attend the oral proceedings scheduled to take place on 29 November 2007.

IX. Oral proceedings were held before the Board on 29 November 2007 in the absence of the Respondent.

At the oral proceedings, the Appellant essentially relied on its arguments presented in its written submissions, and maintained its view that document D3 should be considered as the closest state of the art.

X. The Appellant requested that the decision under appeal be set aside and the patent be revoked.

According to its written submissions, the Respondent requested that the appeal be dismissed and that the

patent be maintained in the form allowed by the Opposition Division.

Reasons for the Decision

1. The appeal is admissible.

2. *Procedural matters*

2.1 As mentioned in Sections VIII and IX above, the Patent Proprietor (Respondent) informed the Board with its letter dated 17 July 2007 that it would not attend the oral proceedings scheduled to take place on 29 November 2007 and the oral proceedings took place in its absence.

2.2 In accordance with Rule 71(2)EPC, the proceedings were continued without the Respondent who had been duly summoned to the oral proceedings. It further follows, that, in accordance with Article 11(3) of the Rules of Procedure of the Boards of Appeal, the Board considers that the absent party relied only on its written submissions.

3. *Novelty*

Novelty of the subject-matter of the claims on the basis of which the Opposition Division intended to maintain the patent in suit was not disputed. Consequently, the only substantive issue remaining in the case is that of inventive step.

4. *The patent in suit, the technical problem*

4.1 The patent in suit relates to a process for the preparation of polyesters by reaction of a dicarboxylic acid and 1,3-propane diol.

4.2 Such process is disclosed in document D6. This document relates to a process for the manufacture of poly(1,3-propylene terephthalate) comprising the step of reacting 1,3 propane diol with terephthalic acid in the presence of a catalyst such as a tin or titanium catalyst while removing water, and the step of polycondensing the reaction product of the first step (D6, page 4, lines 37 to 47).

4.3 As can be deduced from the description of the patent in suit (page 2, lines 5 to 12), its aim is to reduce the level of acrolein in wastewaters coming from the manufacture of 1,3-propane diol based polyesters in order to allow their biological treatment.

4.4 While document D6 has been considered as representing the closest state of the art by the Opposition Division and by the Respondent, the Appellant has submitted that document D3 would represent a better starting point for the assessment of inventive step.

4.5 Document D3 is concerned with the treatment of wastewaters containing acrolein by contacting them with sufficient base to render the pH of the wastewater alkaline at a temperature of about 25°C to 100°C for at least 15 minutes in order to render the wastewaters compatible with a biological treatment (D3, column 1, lines 5 to 55).

4.6 While document D3 refers to the problem of treatment of wastewaters containing acrolein, it is however clear that D3 does not relate to a process for preparing polyesters, let alone for preparing polyesters on the basis of 1,3-propane diol. In other words D3, in contrast to D6, does not belong to the same technical field as the patent in suit.

4.7 It thus follows, that, in the Board's view, D6 would hence represent the closest state of the art for the assessment of inventive step.

4.8 In this context, the Board considers it as belonging to the general knowledge of the person skilled in the art that acrolein is generated as byproduct in the process for the production of polyesters from 1,3 propane diol and dicarboxylic acids. This is not only because this emerges, in the Board's view, from the passage of the patent in suit at lines 3 to 7 on page 2, but furthermore because this is corroborated by the submissions made by the Patent Proprietor at the oral proceedings before the Opposition Division (cf. Minutes of the Oral Proceedings, page 2, point 2.1.2 b).

4.9 Thus, starting from D6, the technical problem may be seen in the provision of a process for producing polyesters from 1,3-propane diol and dicarboxylic acid allowing the biological treatment of the wastewaters generated in that process.

4.10 The solution proposed by the patent in suit is to reduce the amount of acrolein in the wastewaters by

carrying out a process comprising steps (b) to (e) according to Claim 1.

4.11 In view of Example 2 of the patent in suit which shows that a level of less than 1 ppm of acrolein in the wastewaters before biological treatment could be obtained, even without diluting step (d), it is credible to the Board that the technical problem could be effectively solved by the claimed measures. The Board further observes that this has not been contested by the Appellant.

5. *Inventive step*

5.1 It remains to be decided whether the proposed solution was obvious to the person skilled in the art having regard to the relevant prior art.

5.2 As indicated above, document D3 deals with the problem of detoxification of wastewaters containing acrolein in order to render them suitable for a biological treatment. D3 teaches to treat the wastewaters by contacting them with sufficient base to render the pH of the wastewater alkaline, maintaining the alkaline wastewaters at a temperature of about 25°C to 100°C fort least 15 minutes and then degrading the wastewater in a biological system (cf. D3, column 1, lines 47 to 55).

5.3 In other words, D3 discloses a process for detoxifying wastewaters containing acrolein which comprises process steps corresponding to steps (b), (c), and (e) of the process according to Claim 1.

5.4 Consequently, the decisive questions for the assessment of inventive step of the subject-matter of Claim 1 are

(i) whether the skilled person, starting from document D6, would have used the teaching of D3 in order to solve the technical problem underlying the patent in suit, and if question (i) were answered positively

(ii) whether step (d) of the process could nevertheless confer inventive step to the claimed subject-matter.

5.4.1 In this context the Board notes that the Respondent has argued against the combination of the teachings of D6 and D3, because, having regard to the fact that D3 is not concerned with the manufacture of polyesters, the person skilled in the art faced with a problem in the field of polyesters on the basis of 1,3-propanediol and dicarboxylic acid would hence not have looked for a solution of the technical problem outside this specific technical field.

5.4.2 In this connection, the Board however observes that the core of the technical problem is the detoxification of acrolein in the wastewaters before their biological treatment.

5.4.3 In the Board's view, when environmental problems resulting from the presence of a specific component (here acrolein) in wastewaters also occurs in an analogous manner in other technical fields, the skilled person will of course be interested to know the

solution proposed in such technical fields (see also decision T 560/89, OJ 1992, 725; Reasons 5.2).

5.4.4 Consequently, the Board comes to the conclusion that the skilled person would have used the teaching of D3 for solving the technical problem. Question (i) must hence be answered positively.

5.4.5 Thus, the question of inventive step of the subject-matter of Claim 1 boils hence down to the question as to whether the further step (d) of adding an aqueous liquid solution to form a dilute solution containing less than 3 ppm of acrolein could render the claimed process inventive.

5.4.6 In that respect, the Board notes that the Respondent has argued that D3 would teach the skilled person away from diluting the wastewaters before the biological treatment and that it has further relied on the criticality of the value of less than 3 ppm of the acrolein content before the biological treatment for supporting inventive step.

5.4.7 However, the Board firstly observes that the use of a diluting step for reducing the concentration of acrolein in wastewaters containing it to a level not detrimental to the biological treatment is known from D3 (cf. D3, column 1, lines 31 to 36).

5.4.8 While it is true that D3 mentions some disadvantages of a diluting step before the biological treatment (cf. column 1, lines 36 to 44), the mere fact that disadvantages linked with the use of a diluting step have been accepted does not mean that a prejudice has

been overcome when using such diluting step for lowering the concentration of acrolein in the wastewaters to less than 3 ppm before biological treatment (cf. also decision T 69/83 (OJ EPO 1984, 357) and this cannot support the presence of inventive step.

5.4.9 Furthermore, it is noted by the Board that, in view of Example 2 of the patent in suit, very low levels of acrolein in the wastewaters (i.e. below 3 ppm) can already be obtained without any diluting step, so that no technical effect can be associated with such diluting step, which is hence of no relevance for the solution of the technical problem and hence for inventive step.

5.4.10 Nor could, in the Board's view, the alleged criticality of the value less than 3 ppm for acrolein support the presence of inventive step.

5.4.11 This is because it belongs to the general knowledge of the skilled person (cf. D2) that acrolein concentrations above 1 ppm can be toxic for unacclimated biological waste disposal systems, so that it would have been obvious for the skilled person to reduce the concentration of acrolein in the wastewaters to such a low value in order to allow their treatment in biological systems.

5.5 Under these circumstances, the Board can only come to the conclusion that the subject-matter of Claim 1 does not meet the requirements of Article 56 EPC.

5.6 It thus follows that the request of the Respondent that the patent be maintained in the form considered as allowable by the Opposition Division must be refused.

5.7 Consequently, the decision under appeal must be set aside and the patent be revoked.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

E. Görgmaier R. Young