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**Datasheet for the decision
of 3 May 2024**

Case Number: T 1313/22 - 3.3.03

Application Number: 11158665.7

Publication Number: 2365017

IPC: C08G63/16, C08G63/20,
C08G63/78, C08L67/02

Language of the proceedings: EN

Title of invention:

Biomass-resource-derived polyester and production process thereof

Patent Proprietor:

Mitsubishi Chemical Corporation

Opponents:

Jones Day
DuPont Polymers, Inc.

Relevant legal provisions:

EPC Art. 56
RPBA 2020 Art. 12(4), 12(6), 13(1)

Keyword:

Late-filed document - admitted (yes and no)
Inventive step - (all requests: no)

Decisions cited:

T 0035/85, T 0197/86, T 0939/92



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Case Number: T 1313/22 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 3 May 2024

Appellant 1:

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Decision under appeal: Interlocutory decision of the Opposition
Division of the European Patent Office posted on
16 March 2022 concerning maintenance of the
European Patent No. 2365017 in amended form.

Composition of the Board:

Chairman D. Semino
Members: O. Dury
L. Basterreix

Summary of Facts and Submissions

I. The appeals of opponents 2 and 3 lie from the interlocutory decision of the opposition division concerning maintenance of European patent No. 2 365 017 in amended form according to the claims of the main request filed with letter of 18 November 2021 and an adapted description.

II. The following documents were, among others, cited in the decision under appeal:

D6: "The Degradation of Poly(ethylene terephthalate)", L.H. Buxbaum, *Angew. Chem. Internat. Edit.*, 7(1968), 182-190

D17: Automated English translation of JP 2005-139287 A

D17a: Human English translation of JP 2005-139287 A

D19: WO 2005/026232 A1

D19a: English translation of D19

D40: EP 1 679 332 A1

D100: Decision T 1657/16

D119: Supplement to Physical Property Evaluation Example 3 of EP 2 365 017 B1

D120: Declaration by G. Takahashi, A. Kusuno and T. Matsumoto in front of the USPTO, dated 17-18 December 2015

D121: Experimental report by S. Kato

D124: Handbook of Thermoplastics; Edited by Olagoke Olabisi; Marcel Dekker, Inc.; 1997; pages 465-489

D126: EP 0 826 478 A1

- III. The patent at stake in the present appeal proceedings is based on a European patent application that was filed as a divisional application of European patent application 10 002 323.3 (parent), itself filed as divisional application of European patent application 06 732 230.5 (grandparent). The parent application led to a patent that was not opposed. The grandparent application led to the grant of patent EP 1 882 712 B1, which was finally revoked (appeal case dealt by the present Board 3.3.03 in a composition different from the one of the present case, which is above document D100).
- IV. In the decision under appeal, the opposition division in particular reached the conclusion that the subject-matter of claim 1 of the main request involved an inventive step when "Example of execution 2" of D17/ D17a was taken as the closest prior art. Since none of the other objections put forward by the opponents was successful, the patent as amended on the basis of the main request was held to meet the requirements of the EPC. It is further derivable from that decision that a further opposition (filed by then opponent 1) was withdrawn with letter of 16 April 2020 (decision: top of page 2).
- V. Opponents 2 and 3 (appellants 1 and 2) both lodged an appeal against that decision. With their respective statements of grounds of appeal, appellants 1 and 2 further filed documents D17b to D17d and P5, respectively:

D17b: JP 2005-139287 A (original Japanese patent application, which was translated in D17 and D17a)

D17c: Declaration by F. McGee, dated 25 July 2022

D17d: Declaration by J. C. Lievense, dated
25 July 2022

P5: Declaration filed on 24 June 2011 at the US patent and trademark office by two employees of the patent proprietor

VI. With their rejoinder to the statements of grounds of appeal the patent proprietor (respondent) filed among others several sets of claims as auxiliary requests 1 to 10 as well as the following document:

D17e: Statement regarding the translation of the term "fuka" (one page) and accompanying Annexes 1 to 3

VII. The parties were summoned to oral proceedings with letter of 31 May 2023.

VIII. With letter of 2 November 2023, appellant 1 further filed the following document:

D17f: Declaration by W. Smith, dated
26 October 2023

IX. A communication dated 16 January 2024 pursuant to Article 15(1) RPBA and indicating specific issues to be discussed at the oral proceedings was then sent to the parties.

X. With letter of 30 April 2024, appellant 2 stated that they would not attend the oral proceedings.

XI. During the oral proceedings, which were held on 3 May 2024 in the presence of appellant 1 and the respondent, as announced, appellant 1 withdrew their request that their appeal fee be reimbursed.

XII. The **final requests** of the parties were as follows:

Appellants 1 and 2 both requested that the decision of the opposition division be set aside and that the patent be revoked (appellant 2's request having been made in writing).

The respondent requested that the appeals be dismissed (main request) or, in the alternative, that the patent be maintained in amended form according to any of auxiliary requests 1 to 10 filed with their rejoinder to the statements of grounds of appeal.

XIII. Claim 1 of the **main request** read as follows

"1. A pellet obtained from a biomass-resource-derived polyester comprising as a main repeating unit thereof a dicarboxylic acid unit and a diol unit, wherein at least one of the dicarboxylic acid and diol used as raw materials of the polyester is obtained from biomass resources and an amount of terminal acid in the polyester is 50 equivalents/metric ton or less; and wherein a nitrogen atom content in the polyester except nitrogen atoms contained in the covalently bonded functional group in the molecule of the polyester is, in terms of a mass ratio, 0.01 ppm or greater but not greater than 20 ppm relative to the polyester."

XIV. Claim 1 of **auxiliary request 1** was identical to claim 1 of the main request.

XV. Claim 1 of **auxiliary request 2** differed from claim 1 of the main request in that the following feature was added at the end of the claim:

"and wherein the water content in the pellet is, in terms of a mass ratio, 1 ppm or greater but not greater than 3000 ppm relative to the polyester".

XVI. Claim 1 of **auxiliary request 3** differed from claim 1 of auxiliary request 2 in that the water content was limited to 500 ppm (instead of 3000 ppm).

XVII. Claim 1 of **auxiliary request 4** differed from claim 1 of the main request in that the following feature was added at the end of the claim:

"and wherein the dicarboxylic acid constituting the dicarboxylic acid unit has, as a main component thereof, an aliphatic dicarboxylic acid in an amount of 50 mole% or greater, based on the whole dicarboxylic acid unit".

XVIII. Claim 1 of **auxiliary request 5** differed from claim 1 of the main request in that it was amended according to the amendments made in claim 1 of each of auxiliary requests 2 and 4.

XIX. Claim 1 of **auxiliary requests 6 to 10** was identical to claim 1 of auxiliary requests 1 to 5, respectively.

XX. The appellants' arguments, in so far as they are pertinent for the present decision, may be derived from the reasons for the decision below. They are

essentially as follows:

- (a) Documents P5, D17b to D17d and D17f should be admitted into the proceedings.
- (b) The subject-matter of claim 1 of the main request did not involve an inventive step when document D17/D17a was taken as the closest prior art.
- (c) The same conclusion was valid for the subject-matter of claim 1 of each of auxiliary requests 1 to 10.

XXI. The respondent's arguments, in so far as they are pertinent for the present decision, may be derived from the reasons for the decision below. They are essentially as follows:

- (a) Documents P5, D17b to D17d and D17f should be not admitted into the proceedings. Should any of D17b to D17d and D17f be admitted, D17e should be admitted as well.
- (b) The subject-matter of claim 1 of the main request involved an inventive step when document D17/D17a was taken as the closest prior art.
- (c) The same conclusion was valid for the subject-matter of claim 1 of each of auxiliary requests 1 to 10.

Reasons for the Decision

1. Admittance of documents
 - 1.1 Documents D17b to D17d
 - 1.1.1 Together with their statement of grounds of appeal, appellant 1 filed documents D17b to D17d, whose admittance into the proceedings was contested by the respondent. In that respect, the filing of these documents and of the submissions based thereon with the statements of grounds of appeal constitute an amendment to the opponent's case (Article 12(2) and (4) RPBA), the admittance of which undergoes the stipulations of Article 12(4) to (6) RPBA.
 - 1.1.2 D17b to D17d were all filed by appellant 1 in relation to the determination of the meaning of a sentence contained in paragraph 39 of D17 (automated English translation of D17b) in comparison with the one of paragraph 39 of D17a (human English translation of D17b).
 - 1.1.3 In that respect, as put forward by appellant 1 during the oral proceedings before the Board and as derivable from the file history, the meaning of said sentence of paragraph 39 of D17/D17a became relevant for the first time at a late stage of the opposition proceedings, namely in the last written submission of the patent proprietor, which was filed about three weeks before the oral proceedings took place (letter dated 28 December 2021: page 3, last paragraph; see in particular the last sentence thereof; the oral proceedings were held on 18 January 2022).

- 1.1.4 However, said argument of the patent proprietor was not shown to have been contested any further during the opposition proceedings: in particular, no further substantive submissions were made by the opponents in reaction to the patent proprietor's letter of 28 December 2021 either in writing or at the oral proceedings before the opposition division (corrected minutes: points 2.3.1 and 2.4.2).
- 1.1.5 In the decision under appeal, the opposition division relied on the meaning of paragraph 39 of D17/D17a contemplated by the patent proprietor (decision: page 24, third paragraph from the bottom) to reach the conclusion that the feature "nitrogen content in the polyester" constituted a distinguishing feature of the subject-matter being claimed over the disclosure of D17. In doing so, the opposition division appears to have changed their mind as compared to their preliminary opinion (page 11, section directed to "nitrogen content in the polyester", see in particular the last paragraph on that page).
- 1.1.6 In view of the above, although D17b to D17d could have been filed earlier, it cannot be concluded that these documents should have been filed during the opposition proceedings and that it would be justified not to admit them into the proceedings pursuant to Article 12(6) RPBA for that reason.
- 1.1.7 In addition, appellant 1 explained in their statement of grounds of appeal why these documents were only filed at the outset of the appeal proceedings, namely in order to react to the change of mind of the opposition division regarding the teaching carried by paragraph 39 of D17 (statement of grounds of appeal: page 4) following a late submission of the patent

proprietor. In that respect, the Board concurs with appellant 1 that D17b to D17d can be held to have been filed in reaction to a finding of the decision under appeal and at the first opportunity in the appeal proceedings (i.e. once it was clear that the opposition division adhered to the patent proprietor's reading of paragraph 39 of D17/D17a). Under these circumstances, the Board is further satisfied that the stipulations of Article 12(4) RPBA, second paragraph, first sentence as well as third paragraph, are met.

- 1.1.8 For these reasons, the Board found it appropriate to exercise its discretion by admitting documents D17b to D17d into the proceedings (Article 12(4) and 12(6) RPBA).
- 1.2 Document D17e
 - 1.2.1 Together with their rejoinder to the statements of grounds of appeal, the respondent filed document D17e, which is also directed to the meaning of the sentence of paragraph 39 of D17/D17a at stake in D17b to D17d.
 - 1.2.2 Although no request regarding the (non)admittance of D17e was made, D17e can only share the same fate in that regard as D17b to D17d, as a matter of fairness to the respondent.
- 1.3 Document D17f
 - 1.3.1 With letter of 2 November 2023, appellant 1 filed document D17f and requested its admission into the proceedings (page 1, first paragraph), which was contested by the respondent at the oral proceedings before the Board.

1.3.2 Since D17f was submitted after the summons to oral proceedings had been dispatched to the parties in May 2023 (see point VII above) but before the Board's communication pursuant to Article 15(1) RPBA in January 2023 (see point IX) had been issued, it constitutes an amendment of appellant 1's appeal case, the admittance of which is subject to the stipulations of Article 13(1) RPBA. According to this provision, the admittance of such an amendment to a party's case is subject to the discretion of the Board.

1.3.3 In that respect, it is derivable from above sections 1.1 and 1.2 that the issue of the meaning of a specific sentence of paragraph 39 of D17/D17a was at stake since the outset of the appeal proceedings and has been constantly a matter of dispute in view of different interpretations made by the parties from a specific term contained therein. It is further derivable from D17f itself that it was filed in reaction to D17e, as was put forward by appellant 1 (see D17f: points 8, 9, 12; appellant 1's letter of 2 November 2023: page 1, second paragraph). For these reasons, although D17f could have been filed earlier, the Board considers that its filing at that point in time constitutes a normal development of the ongoing proceedings. For these reasons, the Board found it appropriate to exercise its discretion by admitting document D17f into the proceedings (Article 13(1) RPBA).

1.4 Document P5

1.4.1 Considering that document P5 was filed together with appellant 2's statement of grounds of appeal, its admittance undergoes the stipulations of Article 12(4)

to (6) RPBA (see point 1.1.1 above).

1.4.2 In that regard, it is derivable from appellant 2's submissions that P5 and the submissions based thereon were filed in support of their objection of lack of inventive step raised against the operative main request, which is the main request dealt with in the decision under appeal. In particular, P5 was filed in support of their argument that the range of nitrogen content specified in claim 1 of the main request was an arbitrary limitation (statement of grounds of appeal of appellant 2: point 6).

However, said main request was filed by the patent proprietor with letter of 18 November 2021 together with arguments based on D121 supporting an inventive step in relation with the nitrogen content when taking D17 as the closest prior art (see in particular section 4.3 of that letter). A similar line of arguments had already been put forward by the patent proprietor in their letter of 26 October 2020 (section 4.2.3, whereby D121 was then referred to as D126). Also, counterarguments were filed by appellant 2 (then opponent 3) with their letter of 17 December 2021 (sections 16-36 and 47-49), well ahead of the oral proceedings before the opposition division. Under such circumstances, there are no compelling reasons justifying the filing of P5 and of the submissions based thereon only with the statement of grounds of appeal.

1.4.3 Appellant 2 put forward that P5 was a declaration provided by the patent proprietor/respondent in support of a US family member of the patent in suit and was submitted during the opposition and appeal proceedings related to the grandparent patent of the patent in

suit. As a consequence, the respondent could not be taken by surprise by the contents of P5, so appellant 2 (appellant 2's statement of grounds of appeal: point 5).

However, P5 was filed on 24 June 2011 in the US proceedings (see the date indicated on page 1, line 6 of P5) and with letter of 15 February 2016 in the opposition proceedings related to the European grandparent patent of the patent in suit. Therefore, it makes no doubt that P5 could have been filed earlier. In the Board's view, these specific circumstances further show that appellant 2 would even have had good reasons to file P5 earlier in the proceedings, if they had intended to base their objection on this document. For that reason, the circumstances of the present case do not justify the filing of P5 for the first time with the statement of grounds of appeal and the question if the respondent may be taken by surprise by the filing of that document is not relevant.

- 1.4.4 In view of the above, P5 and the arguments based thereon could and should have been submitted during the opposition proceedings. Therefore, the Board found it appropriate that P5 be not admitted into the proceedings pursuant to Article 12(6) RPBA.

Main request

2. The operative main request is the main request on which the decision under appeal is based. Appellants 1 and 2 contested the decision of the opposition division regarding inventive step of claim 1 of that main request when document D17/D17a was taken as the closest prior art.

3. Article 56 EPC

3.1 Closest prior art

3.1.1 The findings of the opposition division that the seven older priorities claimed by the patent in suit were not valid and that, as a consequence, D17/D17a was a valid prior art pursuant to Article 54(2) EPC (reasons: section III.1) that could be relied upon for the assessment of inventive step, were not contested by the respondent.

3.1.2 It was further common ground that, as was held by the opposition division, D17/D17a may suitably be taken as the closest prior art and that Example of execution 2 thereof is particularly relevant and can be taken as starting point for the assessment of inventive step (reasons: section IV.1).

3.1.3 The Board has no reason to deviate from these views.

3.2 Distinguishing feature(s)

3.2.1 In the decision under appeal (reasons: section IV.2), the opposition division considered that the subject-matter of claim 1 of the main request differed from the disclosure of the closest prior art, i.e. Example of execution 2 of D17, in the following features:

(1) the polyester is in the form of a pellet;

(2) the amount of terminal acid groups in the polyester is of 50 equivalents/metric ton or less, and

(3) the nitrogen content (as defined in claim 1 of

the main request) is of 0.01 to 20 ppm.

- 3.2.2 Whereas the parties agreed that above features (1) and (2) effectively distinguished the subject-matter being claimed from the disclosure of the closest prior art, it was in dispute if this was also the case for feature (3).
- 3.2.3 However, it is explicitly stated in paragraph 120 of D17a, that the nitrogen content of the polyester prepared in Example of execution 2 of D17/D17a is 44 ppm, i.e. is significantly above the highest possible amount defined in operative claim 1. Therefore, the Board is satisfied that above feature (3) constitutes a feature distinguishing the subject-matter of operative claim 1 from the disclosure of Example of execution 2 of D17/D17a.
- 3.2.4 In that regard, the opposition division and the parties discussed at length whether or not above feature (3) may be held to be satisfied by Example of execution 2 of D17/D17a in view of the disclosure of D17/D17a as a whole, in particular in view of paragraph 39 thereof (reasons: page 24, starting from the third paragraph). The question posed was if the skilled person would have seriously contemplated purifying further the polymer prepared in Example of execution 2 of D17/D17a, in particular to do so in order to reduce the amount of nitrogen to a value within the range of 0.01 to 20 ppm as defined in operative claim 1.

However, such considerations do not reflect the disclosure of Example of execution 2 of D17/D17a. They are at most related to a further processing step that may be carried out but which is not specifically disclosed as such in the framework of Example of

execution 2 of D17/D17a. Therefore, these considerations are not relevant to assess if the polyester effectively prepared in Example of execution 2 of D17/D17a directly and unambiguously meets the requirements in terms of nitrogen content defined in operative claim 1. In that respect, also the exact meaning of the disclosure of paragraph 39 of D17/D17a (in particular D17a) is not relevant since it is not directed to the specific disclosure of Example of execution 2. In the Board's view, such a discussion can at most be relevant when assessing if the solution provided by operative claim 1 in view of solving the technical problem posed is obvious (section 3.4 below).

3.2.5 In view of the above, the subject-matter of claim 1 of the main request differs from the disclosure of the closest prior art in the three features (1) to (3) identified in section 3.2.1 above.

3.3 Problem effectively solved over the closest prior art

Feature (1)

3.3.1 Regarding the formulation of the technical problem effectively solved, it was common ground that no effect was achieved in relation to feature (1) (pellet form) and the Board has no reason to be of a different opinion.

Features (2) and (3)

3.3.2 Regarding features (2) and (3), the opposition division considered in the decision under appeal that the problem effectively solved over the closest prior art resided in the provision of polyester pellets exhibiting a favourable balance between the mechanical

and hydrolytic stability and the biodegradability rate (reasons: section IV.3). In that respect, the opposition division in particular considered that paragraph 185 of the patent in suit together with the data of D121 showed that the combination of the distinguishing features (2) and (3) as identified in section 3.2.1 above led to an improvement in terms of each of the following properties: hydrolysis resistance, tensile strength and biodegradability in soil.

- 3.3.3 During the appeal proceedings, the respondent, relying on the examples of the patent in suit or on the data of D121, either agreed with the formulation of the technical problem solved by features (2) and (3) over the closest prior art retained by the opposition division (rejoinder: section 2.3) or proposed a slightly modified version thereof, namely to increase mechanical properties/tensile strength and hydrolysis resistance while preserving a good biodegradability (arguments put forward at the oral proceedings before the Board).
- 3.3.4 In that regard, it was not contested by the appellants that, as was concluded in decision T 1657/16 (related to the patent based on the grandparent application of the application on which the patent at stake in the present appeal proceedings is based; see D100: points 1.2.3 and 1.2.4 of the reasons), examples 1, 12 and comparative example 3 of the patent in suit show that the hydrolysis stability of the polyesters decreases as the content of terminal acid groups increases. The Board has no reason to deviate from that view and endorses the finding of decision T 1657/16 in that respect. Therefore, feature (2) as identified in section 3.2.1 above (amount of terminal acid in the

polyester of 50 equivalents/metric ton or less) can be related to an improvement in hydrolysis stability.

Document D121

- 3.3.5 Regarding the arguments based on D121 retained by the opposition division or put forward by the respondent in appeal, the appellants contested that D121 could be relied upon because i) the experiments described therein could not be reproduced and ii) the data contained therein did not allow to make a fair comparison between the subject-matter being claimed and the disclosure of the closest prior art.

Reproducibility of the disclosure of D121

- 3.3.6 Appellant 2 put forward that the data in D121 that were relied upon by the opposition division and the respondent to support an alleged improvement over the closest prior art were not reproducible. Therefore, D121 should not be relied upon, so appellant 2 (statement of grounds of appeal: sections 29 to 32).

a) In that respect, it is correct that the values of terminal acid contents disclosed in tables 1 and 2 of D121 for the same polyesters are not identical. In that regard, the respondent's arguments that the differences in value are due to the fact that two measurements were made at different points in time (right after synthesis of the polyesters vs. before carrying out the hydrolysis resistance test) provide a reasonable explanation for that discrepancy (rejoinder: point 2.6.3). Under these circumstances it can be accepted that the statement made at the bottom of page 4 of D121, according to which the polyesters pellets used to perform the hydrolysis resistance test

were the ones obtained in Experimental Examples 1 and 2 of D121, is credible.

b) It is further correct that it is indicated in D121 that polyesters BSA-755 and BSA-756 were prepared in the same manner (D121: page 3, sentence below "[BSA-755 polymerize]") but exhibit different properties (table 1 of D121). In that regard, it is also credible that the differences in properties reported in table 1 of D121 can be attributed to usual variations of properties when making a given experiment in duplicate, as put forward by the respondent (rejoinder: point 2.6.2).

c) In view of the above, the Board considers that, although the information provided in D121 may at first sight not appear to be fully consistent, the deficiencies indicated by the appellants are not so severe that the data of D121 should be disregarded. In that regard it is further noted that the polyesters used as starting product for the hydrolysis resistance test reported in table 2 of D121 satisfy the requirements in terms of nitrogen content and amount of terminal acid groups according to claim 1 of the main request, i.e. these polyesters are according to claim 1 of the main request (independently of whether the values of terminal acid contents disclosed are according to table 1 or table 2 of D121).

Fair comparison with the closest prior art?

3.3.7 Appellants 1 and 2 both argued that the data in D121 did not allow a fair comparison against the closest prior art. For that reason, according to the appellants, D121 should not be relied upon (appellant 1's statement of grounds of appeal: page 36, section 3.6.4.3; appellant 2's statement of grounds of

appeal: point 28, number (2) and point 32).

a) In the present case, it was not contested by the respondent that the comparative data of D121 did not illustrate the specific teaching of the closest prior art constituted by the disclosure of Example of execution 2 of D17/D17a. The Board can only agree with the appellants' view since, for instance, the comparative data of D121 were not obtained from pure bio-produced raw material as was done in Example of execution 2 of D17/D17a (see statement of grounds of appeal of appellant 1: section 3.6.4.3; in D121 the raw materials were spiked with a chemically synthesized ammonia compound) or were prepared by a process that deviated from the disclosure of D17/D17a (as argued by appellant 1 at the oral proceedings before the Board: see different polymerisation times derivable from paragraphs 118 and 120 of D17a vs. D121, preparation processes described on pages 3 and at the top of page 4). Also, it was not shown by the respondent that the yellowness index indicated in table 1 of D121 for the comparative examples (BSA-764 and BSA-765) reflects the properties of the polyester prepared in Example of execution 2 of D17/D17a, which apparently shows a significantly lower yellowness index (D17a: paragraph 120, line 10, yellowness index of 12; D121: table 1, yellowness index of comparative samples BSA-764 and BSA-765 of 50.11 and 48.28). Regarding the latter, although the yellowness indexes were apparently determined with a possibly different method in D17/D17a and D121 (D17a: paragraph 44, line 8; D121: paragraph bridging pages 2 and 3), it was neither shown, nor even argued by the respondent that the yellowness indexes determined in D121 were comparable to the one disclosed in D17/D17a for Example of execution 2.

It is further noted that no evidence was provided by the respondent to show that the deviations made in the comparative examples of D121 as compared to the specific disclosure of Example of execution 2 of D17/D17a had no impact on the properties of the polyesters prepared. In that respect, the Board considers that, in the absence of any evidence and quantification regarding the effect of the modifications made by the respondent in the preparation of the comparative examples of D121 as compared to the disclosure of Example of execution 2 of D17/D17a, the impact of these modifications on the properties of the polyesters being prepared cannot be ascertained. In particular, it cannot be excluded that polyesters having significantly different properties were prepared in D121 as compared to the ones of the polyester according to the closest prior art. Regarding the issue of the burden of proof, which was briefly addressed by the parties at the oral proceedings before the Board, the Board considers that it would have been upon the respondent to establish that any deviation they chose to make from the disclosure of D17/D17a was immaterial to the properties of the polyesters so prepared, i.e. that independently of the choices made, the polyesters prepared in D121 for comparison purpose were effectively according to the disclosure of Example of execution 2 of D17 or at least representative of it. This would have been in particular expedient in the present case in view of the significantly different values of yellowness index obtained in D121 for the comparative polyesters as compared to the yellowness index of the polyester according to the closest prior art. In the absence of any evidence in that regard, the respondent did not discharge their burden of proof and it is not justified that it be shifted to the appellants.

For these reasons, the comparative examples carried out in D121 cannot be held to constitute a fair rework of the disclosure of Example of execution 2 of D17/D17a.

b) According to established case law (Case Law, *supra*, I.D.4.3.2; see in particular T 35/85: section 4 of the reasons, and T 197/86, OJ EPO 1989, 371: section 6.1.3 of the reasons), it is accepted that the patent proprietor (here, the respondent) may discharge his onus of proof by voluntarily submitting comparative tests with newly prepared variants of the closest state of the art identifying the features common with the invention, in order to have a variant lying closer to the invention so that the advantageous effect attributable to the distinguishing feature is thereby more clearly demonstrated. In that respect, if comparative tests are chosen to demonstrate an inventive step on the basis of an improved effect over a claimed area, care should nevertheless be taken that the nature of the comparison with the closest state of the art is such that the alleged advantage or effect is convincingly shown to have its origin in the distinguishing feature of the invention compared with the closest state of the art.

It seems that this criterion was retained by the opposition division to reach their conclusion that D121 effectively supported the improvement claimed by the respondent to be achieved (reasons: page 30, second paragraph related to "Experiments BSA-764 and -765").

However, in the present case, it remained undisputed that the comparative examples of D121 do not illustrate the disclosure of the closest prior art (this was even acknowledged by the opposition division) and no reasons were given as to why they could be representative of it

or relate to variants of it closer to the invention. Under these circumstances, even if D121 were to show that an effect related to the above distinguishing feature(s) were present and if it were held that the experiments carried out in D121 effectively illustrate the subject-matter of claim 1 of the main request, this would not allow to conclude that such a beneficial effect is mandatorily achieved **over the closest prior art**.

c) In view of the above, the data of D121 do not allow to conclude that any effect was credibly shown to be obtained for polyesters according to claim 1 of the main request as compared to the one according to the disclosure of the closest prior art, namely Example of execution 2 of D17/D17a.

3.3.8 Under these circumstances, there is no need for the Board to assess whether or not the data of D121 demonstrate that a synergy between above features (2) and (3) prevails, as apparently considered in the decision under appeal (page 29: first full paragraph; page 30, last paragraph), but which was contested by the appellants. As an aside, it is further noted that, questioned by the Board at the oral proceedings, the respondent acknowledged that there were no data on file that could suitably demonstrate a synergy between features (2) and (3), i.e. showing that these features interacted one with the other so as to produce a combined effect that was greater than the sum of their separate effect.

3.3.9 Although the above finding is sufficient to disregard the data contained in D121 for the formulation of the problem effectively solved over the closest prior art, the Board further came to the conclusion that even if

D121 had been considered, these data would at most have evidenced effects that are conform to the skilled person's expectations. Indeed, it is derivable from table 1 of D121 that the comparative examples prepared therein (samples BSA-764 and BSA-765) exhibited a significantly lower intrinsic viscosity than the examples illustrative of the subject-matter of claim 1 of the main request (samples BSA-755 and BSA-756), which means that they had a significantly lower molecular weight. Therefore, the fact that the comparative examples of D121 have deteriorated hydrolysis resistance and tensile strength (D121: tables 2 and 3) and improved biodegradability (D121: table 4) is not surprising (since these effects are in line with the differences in molecular weights). In addition, that difference in intrinsic viscosity further renders questionable the fairness of the comparisons made in D121: indeed, in view of that difference, it cannot be concluded that any alleged advantage or effect shown in D121 mandatorily has its origin in the distinguishing features of the invention compared with the closest state of the art, namely features (2) and/or (3) as identified in section 3.2.1 above.

Documents D119 and D120

3.3.10 The respondent further argued that D119 and D120 showed that the above distinguishing feature (3) (nitrogen content) led to improved biodegradability (rejoinder: page 13, section 2.3.3, second paragraph).

a) However, as already indicated in the decision under appeal (page 32: fourth paragraph, directed to arguments of the opponents), D120 does not allow a fair comparison with the closest prior art since the

comparison is only done with polyesters according to claim 1 of the main request with polyesters that are free of nitrogen (which is not the case of the polyester prepared in Example of execution 2 of D17/D17a). The same is also valid regarding the comparison of data of D119 or of the patent in suit mentioned by the respondent (rejoinder: page 13, section 2.3.3, first paragraph). Therefore, the respondent's arguments are not convincing.

b) As a matter of completeness, it is further noted that it can be agreed with the respondent that it is shown in table 4 of D119 or in tables 2-3 of D120 that while a polyester satisfying features (2) and (3) (in particular a nitrogen content of 2, 3, 6 or 8 ppm) according to above section 3.2.1 exhibits an acceptable biodegradation, this is not the case for a similar polyester that exhibits a comparable value of feature (2) but has a nitrogen content according to feature (3) of zero. These results, however, in the Board's view, do not render credible that an improvement in terms of biodegradability is effectively achieved on the whole scope of the claims, in particular for polyesters with a nitrogen content as low as 0.01 ppm as defined in claim 1 of the main request.

3.3.11 In view of the above, there is further no reason to consider in the present case that the distinguishing features identified in point 3.2.1 above act in synergy with one another, which means that their respective inventive contributions can be analysed separately. In that regard, it is derivable from the above that while features (1) and (3) are not related to any technical effect, feature (2) leads to improved hydrolytic stability. For these reasons, the technical problem solved over the closest prior art is seen as residing

in the provision of polyester pellets with improved hydrolytic stability, which was not disputed by the appellants (appellant 1's statement of grounds of appeal: page 22, section 3.3; appellant 2's statement of grounds of appeal: point 62).

3.4 Obviousness

3.4.1 The question remains to be answered if the skilled person, desiring to solve the problem(s) identified as indicated above, would, in view of the closest prior art, possibly in combination with other prior art or with common general knowledge, have modified the disclosure of the closest prior art in such a way as to arrive at the claimed subject matter.

3.4.2 In the absence of a synergistic effect achieved by any combination of the distinguishing features (1), (2) and (3) as identified in above section 3.2.1 the obviousness of the subject-matter according to claim 1 of the main request may be assessed by considering each of these features individually.

3.4.3 Regarding feature (1) (pellet), in the absence of any argument put forward by the respondent in that respect (in particular at the oral proceedings before the Board), there is no reason for the Board to deviate from the conclusion reached by the opposition division that said feature was conventional in the art and did not contribute to an inventive step (reasons: point IV. 3.5, first paragraph, passage related to feature "(1)").

3.4.4 Further, it remained undisputed that, as already concluded in respect of the patent based on the grandparent application in decision T 1657/16 (reasons:

point 1.2.5; said decision is document D100 of the present proceedings), the adjustment of terminal acid groups (i.e. feature (2) identified in section 3.2.1 above: amount of terminal acid) in order to optimise the hydrolytic stability of a polyester such as the one prepared in Example of execution 2 of D17 is obvious in view of the teaching of D19a/D40 (D19a and D40 of the present proceedings are E19 and E40, respectively, as indicated in section III of decision T 1657/16).

3.4.5 Regarding feature (3) identified in section 3.2.1 above (nitrogen content), the opposition division considered that the skilled person would have had no motivation to further reduce the amount of nitrogen of the polyester in view of the teaching of D17/D17a itself, in particular because the level of nitrogen obtained was already sufficiently low and further taking into account that it was derivable from D17/D17a (paragraph 39) that further purification would be technically burdensome (reasons: section IV.3.5 - in particular page 34 -, with reference to section III.2 - see in particular page 24 of the decision).

a) However, the established decisive principle governing the answer to the question as to what a person skilled in the art would have done depends on the result they wished to obtain (T 939/92, OJ EPO 1996, 309: point 2.5.3 of the reasons). In the present case, since it was not shown that said feature (3) is related to any surprising technical effect, no suggestion in the prior art is needed in order to render the subject-matter claimed obvious. Rather, it is sufficient to show that said missing feature constitutes an arbitrary selection within a host of available alternatives. In that regard, it is indicated in paragraph 37 of D17/D17a that a most preferred

embodiment of the invention disclosed therein is a polyester exhibiting a nitrogen content of less than 50 ppm. Therefore, achieving a level nitrogen of e.g. 20 ppm is well within the ambit of D17/D17a. In that regard, D17/D17a teaches in paragraph 22 various purification methods to achieve that goal and it was not shown that the skilled person could not achieve a level of nitrogen according to claim 1 of the main request by using one of these methods. Even if, to the respondent's benefit, it were to be concluded that paragraph 39 of D17 indicates that it may be difficult to achieve such a low amount of nitrogen, there is no evidence on file that this would not be possible. The fact that it might be difficult to do so from a technical point of view does not constitute a sufficient reason to support an inventive step.

b) The above conclusion is further confirmed by the fact that the polyester prepared in Example of execution 2 of D17/D17a exhibits a yellowness index of 12 (D17a: paragraph 120, penultimate sentence), which is higher than the most preferred yellowness index of 10 or less aimed at in D17/D17a (D17a: paragraph 40). Further considering that D17/D17a teaches that the yellowness index increases with higher amounts of nitrogen (paragraph 37), the skilled person would in the present case even have had good reasons to seek to (further) reduce the nitrogen content of the polyester prepared in Example of execution 2 of D17/D17a.

c) Under these circumstances, achieving a level of nitrogen of e.g. 20 ppm according to feature (3) identified in section 3.2.1 above constitutes a mere arbitrary measure to take.

- 3.4.6 In view of the above, starting from Example of execution 2 of D17/D17a, it was obvious to solve the problem indicated in section 3.3.11 above by preparing a polyester as defined in claim 1 of the main request by modifying the amount of terminal acid groups according to the teaching of D19/D40, while reducing the amount of nitrogen according to the teaching of D17/D17a itself and preparing pellets of that polyester in a conventional manner.
- 3.4.7 In view of the above, the subject-matter of claim 1 of the main request does not involve an inventive step in view of D17/D17a as the closest prior art and the main request is not allowable (Article 56 EPC).

Auxiliary request 1

4. Considering that claim 1 of **auxiliary request 1** is identical to claim 1 of the main request, it can only share the same fate. For that reason, auxiliary request 1 is not allowable (Article 56 EPC).

Auxiliary requests 2 and 3

5. Claim 1 of each of **auxiliary requests 2 and 3** differ from claim 1 of the main request in that it is further specified therein that the water content in the pellet is, in terms of a mass ratio, in a specific range.
- 5.1 In that respect, it remained undisputed between the parties that D17/D17a failed to provide any indication of the water content of the polyester prepared in Example of execution 2 thereof and that there was no evidence in that respect on file (see rejoinder: section III.2, third paragraph). Therefore, the

amendment made in claim 1 of each of auxiliary requests 2 and 3 constitutes an additional feature (4) distinguishing the subject-matter of claim 1 of these auxiliary requests from the disclosure of the closest prior art.

5.1.1 The respondent argued that it was derivable from paragraphs 154 and 332-341 of the patent in suit that such a water content was related to improved hydrolysis resistance during storage of the pellets (rejoinder: page 31, last paragraph). In the absence of any counterarguments on the side of the appellants, the Board is satisfied that that effect can be taken up in the formulation of the technical problem solved over the closest prior art (in addition to the one defined above for claim 1 of the the main request). However, in the absence of any evidence related to other effects relied upon by the respondent (colouration, hard spots as mentioned in paragraph 154 of the patent in suit), these effects cannot be taken into account.

5.1.2 Regarding obviousness, the Board shares appellant 1's view that the additional effect regarding improved hydrolysis resistance during storage of the pellets is obvious in view of common general knowledge, in particular as also disclosed in D17/D17a (as put forward at the oral proceedings before the Board), D6 (statement of grounds of appeal: point V.2.2) or as taught in D126 (statement of grounds of appeal: page 40, first paragraph, in respect of auxiliary request 3) and D124 (oral proceedings before the Board: D124, page 479, section 2 "Hydrolytic Stability").

a) In particular, it is explicitly stated in D17/D17a itself that the polyesters prepared therein may be deteriorated by hydrolysis (D17: paragraph 37, seventh

line) and it is well established in chemistry that the term "hydrolysis" refers to the chemical breakdown of a compound due to the action of water. Therefore, already on that basis, it would be obvious to control the hydrolysis resistance of the polyester according to the closest prior art by controlling that the amount of water of the polyester is at a low level, in particular at a level as defined in claim 1 of auxiliary requests 2 and 3.

b) In addition, the Board is satisfied that the additional references relied upon by the respondents as evidence of common general knowledge (D6, D124, D126) are related to the question of the hydrolysis of ester bonds in polyesters in general and that these disclosures would not be understood by the skilled person to be limited to a specific type of polyester, as put forward by the respondent at the oral proceedings before the Board in view of the fact that, for instance, D6 and D124 were directed to polyethylene terephthalate and polybutylene terephthalate, respectively. Therefore, also these prior art documents show that the skilled person would have had good reasons to control the level of water of the polyester according to the closest prior art.

c) On that issue, the respondent further argued that D6 was solely directed to the stability of fossil-fuel-derived polyethylene terephthalate against hydrolysis and not to biomass-resource derived polyesters containing nitrogen compounds (rejoinder: section III.2, page 32, first paragraph).

However, considering the reference in D6 to "ester bonds" in general and further taking into account that the nature of such an ester bond is independent of the

origin of the chemical component involved (diacid and diol), the skilled person would have had no reason to consider that the teaching of D6, which is quite general, (see e.g. the first sentence of section 5.1.1) would not be valid for polyesters prepared according to the teaching of Example of execution 2 of D17/D17a. That conclusion is confirmed by the fact that concerns regarding hydrolysis resistance are addressed in D17/D17a itself (paragraph 37, seventh line).

d) It is correct that, as put forward by the respondent, D126 (page 8, lines 13-17) discloses that in some instances the skilled person may work with undried polyesters, i.e. polyesters containing some water. However, said statement should be read in the context of D126, which further states that, should the polyester contain water, the latter would be removed at a later stage by the process used therein. Besides, D126 also specifically discloses that polyesters may deteriorate due to hydrolysis (page 3, lines 11-12; page 4, lines 6-7; page 7, line 39; page 8, line 20), which confirms that the skilled person is well aware that the presence of water may be detrimental.

e) For these reasons, the respondent's arguments did not convince and the amendment made in claim 1 of auxiliary requests 2 and 3 cannot be held to contribute to an inventive step.

5.1.3 In view of the above, the subject-matter of claim 1 of each of auxiliary requests 2 and 3 does not involve an inventive step in view of D17/D17a as the closest prior art and these requests are not allowable (Article 56 EPC).

Auxiliary request 4

6. Claim 1 of **auxiliary request 4** differs from claim 1 of the main request in that it is further specified that the dicarboxylic acid constituting the dicarboxylic acid unit has, as a main component thereof, an aliphatic dicarboxylic acid in an amount of 50 mole% or greater (emphasis by the Board).

However, as put forward by appellant 1 (statement of grounds of appeal: page 41, section V.4.2), said amendment does not constitute an additional feature distinguishing the subject-matter being claimed from the disclosure of the closest prior art (Example of execution 2 of D17/D17a). Therefore, said amendment cannot overcome the objection of lack of inventive step retained against claim 1 of the main request and auxiliary request 4 can only share the same fate as the main request regarding inventive step in view of D17/D17a, i.e. it is not allowable (Article 56 EPC).

Auxiliary request 5

7. Claim 1 of **auxiliary request 5** combines the amendments of claim 1 of auxiliary requests 2 and 4. It was agreed by the respondent at the oral proceedings before the Board that claim 1 of auxiliary request 5 can only share the same fate regarding inventive step in view of D17/D17a as the closest prior art as claim 1 of the higher ranked requests. In particular, no additional or separate arguments were put forward for that request as compared to the higher ranked requests. Therefore, claim 1 of auxiliary request 5 is not inventive and that request is not allowable (Article 56 EPC).

Auxiliary requests 6 to 10

8. Claim 1 of **auxiliary requests 6 to 10** is identical to claim 1 of auxiliary requests 1 to 5, respectively. Therefore, these auxiliary requests are not allowable for the same reasons as the ones indicated above for auxiliary requests 1 to 5.

9. Since none of the respondent's requests is allowable, the patent is to 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:



A. Pinna

D. Semino

Decision electronically authenticated