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**Datasheet for the decision
of 15 July 2014**

Case Number: T 2119/12 - 3.3.03

Application Number: 06707635.6

Publication Number: 1858951

IPC: C08G63/183, C08G63/16,
C08L67/02

Language of the proceedings: EN

Title of invention:
BIODEGRADABLE ALIPHATIC -AROMATIC POLYESTERS

Patent Proprietor:
NOVAMONT S.p.A.

Opponent:
E.I. DU PONT DE NEMOURS AND COMPANY

Headword:

Relevant legal provisions:
RPBA Art. 12(4), 13(1)
EPC Art. 123(3), 123(2), 83, 111(1)

Keyword:

Request to hold inadmissible main, first and second auxiliary request under Article 12(4) RPBA - rejected
Main and first auxiliary requests: extension of scope of protection
First and second auxiliary requests: amendments going beyond the original disclosure
Third auxiliary request: admitted into the proceedings - amendments allowable
Third auxiliary request: admitted into the proceedings - sufficiency of disclosure acknowledged
Remittal to the department of first instance

Decisions cited:

Catchword:



**Beschwerdekammern
Boards of Appeal
Chambres de recours**

European Patent Office
D-80298 MUNICH
GERMANY
Tel. +49 (0) 89 2399-0
Fax +49 (0) 89 2399-4465

Case Number: T 2119/12 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 15 July 2014

Appellant:
(Patent Proprietor)

NOVAMONT S.p.A.
Via G. Fauser, 8
28100 Novara (IT)

Representative:

Zanoli, Enrico
Zanoli & Giavarini S.r.l.
Via Melchiorre Gioia, 64
20125 Milano (IT)

Respondent:
(Opponent)

E.I. DU PONT DE NEMOURS AND COMPANY
1007 Market Street
Wilmington DE 19898 (US)

Representative:

Dannenberger, Oliver Andre
Abitz & Partner
Patentanwälte mbB
Postfach 86 01 09
81628 München (DE)

Decision under appeal:

**Decision of the Opposition Division of the
European Patent Office posted on 30 July 2012
revoking European patent No. 1858951 pursuant to
Article 101(3) (b) EPC.**

Composition of the Board:

Chairwoman B. ter Laan
Members: F. Rousseau
R. Cramer

Summary of Facts and Submissions

I. The appeal by the patent proprietor (appellant) lies from the decision of the opposition division posted on 30 July 2012 revoking European patent No. 1 858 951 in respect of European patent application No. 06 707 635.6, which is based on the international application PCT/EP2006/002670 and published under WO 2006/097353.

II. Claims 1, 2, 3, 6, 7, 8 and 10 as filed and as granted read as follows:

"1. Biodegradable aliphatic/aromatic copolyester (AAPE) comprising:

A) an acid component comprising repeating units of:

1) 50 to 60 mol % of an aromatic polyfunctional acid;
2) 40 to 50 mol % of an aliphatic acid, at least 90% of which is a long-chain dicarboxylic acid (LCDA) of natural origin selected from azelaic acid, sebacic acid, brassylic acid or mixtures thereof;

B) at least one diol component; said aliphatic long-chain dicarboxylic acid (LCDA) and said diol component (B) having a number of carbon atoms according to the following formula:

$$(C_{LCDA} \cdot Y_{LCDA}) / 2 + C_B \cdot Y_B > 7.5$$

where:

- C_{LCDA} is the number of carbon atoms of the LCDA and can be 9, 10 or 13;
- Y_{LCDA} is the molar fraction of each LCDA on the total number of moles of LCDA;
- C_B is the number of carbon atoms of each diol component;

- Y_B is the molar fraction of each diol on the total number of moles of the diol component (B)

said AAPE having:

-a biodegradability after 90 days higher than 70%, with respect to pure cellulose according to the Standard ISO 14855 Amendment 1;

-a density of equal to or less than 1.2 g/cc;

-a number average molecular weight M_n of 40,000 - 140,000;

-an inherent viscosity of 0.8 - 1.5.

2. Biodegradable polyester according to Claim 1, **characterized in that** said aromatic dicarboxylic acid is selected from the group consisting of the phthalic acids.

3. Bioedgradable (sic) polyester according to claim 2, **characterized in that** said aromatic dicarboxylic acid is terephthalic acid.

6. Biodegradable polyester according to claim 1, **characterized in that** said diol is selected from the group consisting of: 1,2-ethandiol, 1,2-propandiol, 1,3-propandiol, 1,4-butandiol, 1,5-pentandiol, 1,6-hexandiol, 1,7-heptandiol, 1,8-octandiol, 1,9-nonandiol, 1,10-decandiol, 1,11-undecandiol, 1,12-dodecandiol, 1,13-tridecandiol, 1,4-cyclohexandimethanol, propylene glycol, neo-pentyl glycol, 2-methyl-1,3-propandiol, dianhydrosorbitol, dianhydromannitol, dianhydroiditol, cyclohexandiol, and cyclohexanmethandiol.

7. Biodegradable polyester according to Claim 6, **characterized in that** said diol has from 2 to 10 carbon atoms.

8. Biodegradable polyester according to Claim 7, **characterized in that** said diol has from 2 to 4 carbon atoms.

10. Biodegradable polyester according to Claim 1, **characterized in that** said biodegradability after 90 days is higher than 80%."

III. The opponent (respondent) had requested the revocation of the patent in its entirety on the grounds that the claimed subject-matter lacked novelty and an inventive step (Article 100(a) EPC) and was insufficiently disclosed (Article 100(b) EPC).

In point 6.4.3 of a communication sent in annex to the summons to attend oral proceedings the opposition division had indicated that the degree of biodegradability defined in claim 1 of the patent as granted was the inevitable result of the other features of that claim.

During the oral proceedings before the opposition division held on 3 July 2012, the opposition division, however, concluded that the patent did not give a clear technical teaching on how to achieve a polyester fulfilling the biodegradability and the other properties as defined in the claims as granted. That finding was based on an analysis of the biodegradability obtained with polyesters according to Examples 2-4 (comparative) and Example 7 of the patent in suit. The opposition division indicated that the aromatic acid alone was not responsible for the biodegradability, as alleged by the proprietor. In particular, the skilled person did not know why the polyesters according to comparative examples 2 and 3 met the requirement of biodegradability, while that of

comparative Example 4 did not. It was concluded that the skilled person was not given a clear technical teaching on how to achieve the required degree of biodegradability and had to resort to trial and error to obtain, from the vast number of possibilities offered by the structural definition of claim 1, those providing that result. This amounted to an undue burden and lack of sufficiency of disclosure. In view of that conclusion, during the oral proceedings the proprietor submitted a new main request, on the basis of which the impugned decision was taken. The claims according to that new request differed from those as granted in that the feature "a biodegradability after 90 days higher than 70%, with respect to pure cellulose according to the Standard ISO 14855 Amendment 1" had been deleted.

According to the impugned decision, the deletion in claim 1 of the feature defining the biodegradability of the polyester extended the protection conferred by the patent as granted since that feature was an essential feature providing a technical contribution to the claimed invention. Hence, the main request was not allowable in view of Article 123(3) EPC so that the patent was revoked.

IV. With the statement setting out the grounds of the appeal filed on 30 November 2012, the appellant submitted sets of claims as the main and five auxiliary requests. The respective claims 1 of the main request and the first and second auxiliary request read as follows (the deletions made in claim 1 as granted - which corresponds to claim 1 as originally filed - are indicated in strike-through and the additions in bold and underlined):

Main Request

"1. Biodegradable aliphatic/aromatic copolyester (AAPE) comprising:

A) an acid component comprising repeating units of:

- 1) 50 to 60 mol % of an aromatic polyfunctional acid;
- 2) 40 to 50 mol % of an aliphatic acid, at least 90% of which is a long-chain dicarboxylic acid (LCDA) of natural origin selected from azelaic acid, sebacic acid, brassylic acid or mixtures thereof;

B) at least one diol component; said aliphatic long-chain dicarboxylic acid (LCDA) and said diol component (B) having a number of carbon atoms according to the following formula:

$$(C_{LCDA} \cdot Y_{LCDA}) / 2 + C_B \cdot Y_B > 7.5$$

where:

- C_{LCDA} is the number of carbon atoms of the LCDA and can be 9, 10 or 13;
- Y_{LCDA} is the molar fraction of each LCDA on the total number of moles of LCDA;
- C_B is the number of carbon atoms of each diol component;
- Y_B is the molar fraction of each diol on the total number of moles of the diol component (B)

said AAPE having:

~~- a biodegradability after 90 days higher than 70%, with respect to pure cellulose according to the Standard ISO 14855~~

~~Amendment 1;~~

- a density of equal to or less than 1.20 g/cc;

- a number average molecular weight M_n of 40,000 - 140,000;
- an inherent viscosity of 0.8 - 1.5."

First Auxiliary Request

"1. Biodegradable aliphatic/aromatic copolyester (AAPE) comprising:

A) an acid component comprising repeating units of:

- 1) 50 to 60 mol % of terephthalic ~~an aromatic polyfunctional~~ acid;
 - 2) 40 to 50 mol % of an aliphatic acid, at least 90% of which is a long-chain dicarboxylic acid (LCDA) of natural origin selected from azelaic acid, sebacic acid, brassylic acid or mixtures thereof;
- B) at least one diol component; said aliphatic long-chain dicarboxylic acid (LCDA) and said diol component (B) having a number of carbon atoms according to the following formula:

$$(C_{LCDA} \cdot Y_{LCDA}) / 2 + C_B \cdot Y_B > 7.5$$

where:

- C_{LCDA} is the number of carbon atoms of the LCDA and can be 9, 10 or 13;
 - Y_{LCDA} is the molar fraction of each LCDA on the total number of moles of LCDA;
 - C_B is the number of carbon atoms of each diol component, **and is 2, 3 or 4**
 - Y_B is the molar fraction of each diol on the total number of moles of the diol component (B)
- said AAPE having:

~~-a biodegradability after 90 days higher than 70%, with respect to pure cellulose according to the Standard ISO 14855~~

~~Amendment 1;~~

-a density of equal to or less than 1.20 g/cc;

-a number average molecular weight M_n of 40,000 - 140,000;

-an inherent viscosity of 0.8 - 1.5."

Second Auxiliary Request

"1. Biodegradable aliphatic/aromatic copolyester (AAPE) comprising:

A) an acid component comprising repeating units of:

1) 50 to 60 mol % of terephthalic ~~an aromatic polyfunctional~~ acid;

2) 40 to 50 mol % of an aliphatic acid, at least 90% of which is a long-chain dicarboxylic acid (LCDA) of natural origin selected from azelaic acid, sebacic acid, brassylic acid or mixtures thereof;

B) at least one diol component; said aliphatic long-chain dicarboxylic acid (LCDA) and said diol component (B) having a number of carbon atoms according to the following formula:

$$(C_{LCDA} \cdot Y_{LCDA}) / 2 + C_B \cdot Y_B > 7.5$$

where:

- C_{LCDA} is the number of carbon atoms of the LCDA and can be 9, 10 or 13;

- Y_{LCDA} is the molar fraction of each LCDA on the total number of moles of LCDA;

- C_B is the number of carbon atoms of each diol component, and is 2, 3 or 4

- Y_B is the molar fraction of each diol on the total number of moles of the diol component (B)

said AAPE having:

-a biodegradability after 90 days higher than 70%, with respect to pure cellulose according to the Standard ISO 14855

Amendment 1;

-a density of equal to or less than 1.20 g/cc;

-a number average molecular weight M_n of 40,000 - 140,000;

-an inherent viscosity of 0.8 - 1.5."

V. By letter dated 12 April 2013 the respondent replied to the appeal.

VI. With letter of 19 December 2013 the appellant filed further submissions.

VII. In a communication by the Board dated 4 June 2014, sent in preparation to oral proceedings, it was indicated that the Board was inclined to admit the requests submitted with the statement setting out the grounds of the appeal to the proceedings. The Board also addressed issues with respect to Rule 80 EPC and Articles 123(2), 123(3) and 84 EPC, as well as sufficiency of disclosure. It was in particular pointed out that the definition in the claims 1 of the first and second auxiliary request that each diol should have a number of carbon atoms (CB) of 2, 3 or 4 appeared to contravene Article 123(2) EPC. Moreover, the parties were informed that they should be ready to discuss sufficiency of disclosure and in particular the influence of the various structural variables as described in the claims 1, i.e. aromatic units, their content, the type of LCDA and their content, as well as the type of diol on the various properties of the

polymer such as density, molecular weight, inherent viscosity and biodegradability.

VIII. With letter of 18 June 2014 the appellant submitted additional sets of claims as further auxiliary requests, in particular a seventh auxiliary request, claim 1 of which read as follows (the deletions made in claim 1 as granted - which corresponds to claim 1 as originally filed - are indicated in strikethrough and the additions in bold and underlined):

"1. Biodegradable aliphatic/aromatic copolyester (AAPE) comprising:

A) an acid component comprising repeating units of:

1) 50 to 60 mol % of ~~an aromatic polyfunctional~~ **terephthalic** acid;

2) 40 to 50 mol % of an aliphatic acid, at least 90% of which is a long-chain dicarboxylic acid (LCDA) of natural origin selected from azelaic acid, sebacic acid, brassylic acid or mixtures thereof;

B) at least one diol component selected from the group consisting of 1,2-ethandiol, 1,2-propandiol, 1,3-propandiol, 1,4-butandiol, 1,5-pentandiol, 1,6-hexandiol, 1,7-heptandiol, 1,8-octandiol, 1,9-nonandiol, 1,10-decandiol, 1,11-undecandiol, 1,12-dodecandiol, 1,13-tridecandiol, 1,4-cyclohexandimethanol, propylene glycol, neo-pentyl glycol, 2-methyl-1,3-propandiol, dianhydrosorbitol, dianhydromannitol, dianhydroiditol, cyclohexandiol, and cyclohexanmethandiol;

said aliphatic long-chain dicarboxylic acid (LCDA) and said diol component (B) having a number of carbon atoms according to the following formula:

$$(C_{LCDA} \cdot Y_{LCDA}) / 2 + C_B \cdot Y_B > 7.5$$

where:

- C_{LCDA} is the number of carbon atoms of the LCDA and can be 9, 10 or 13;
- Y_{LCDA} is the molar fraction of each LCDA on the total number of moles of LCDA;
- C_B is the number of carbon atoms of each diol component, **and is 2, 3 or 4**
- Y_B is the molar fraction of each diol on the total number of moles of the diol component (B)

said AAPE having:

- a biodegradability after 90 days higher than 70%, with respect to pure cellulose according to the Standard ISO 14855 Amendment 1;
- a density of equal to or less than 1.20 g/cc;
- a number average molecular weight M_n of 40,000 - 140,000;
- an inherent viscosity of 0.8 - 1.5."

- IX. The respondent replied to the Board's communication with letter of 20 June 2014, in which they announced that they would not attend the oral proceedings.
- X. In the course of the oral proceedings which took place on 15 July 2014, the seventh auxiliary request of 18 June 2014 was promoted to third auxiliary request and was then replaced by a new third auxiliary request, independent claim 1 of which read as follows (the deletions made in claim 1 as granted -which corresponds to claim 1 as originally filed - are indicated in strike through and the additions in bold and underlined):

"1. Biodegradable aliphatic/aromatic copolyester (AAPE) comprising:

A) an acid component comprising repeating units of:

1) 50 to 60 mol % of ~~an aromatic polyfunctional~~ **terephthalic** acid;

2) 40 to 50 mol % of an aliphatic acid, at least 90% of which is a long-chain dicarboxylic acid (LCDA) of natural origin selected from azelaic acid, sebacic acid, brassylic acid or mixtures thereof;

B) at least one diol component selected from the group consisting of 1,2-ethandiol, 1,2-propandiol, 1,3-propandiol, 1,4-butandiol, 2-methyl-1,3-propandiol said aliphatic long-chain dicarboxylic acid (LCDA) and said diol component (B) having a number of carbon atoms according to the following formula:

$$(C_{LCDA} \cdot Y_{LCDA}) / 2 + C_B \cdot Y_B > 7.5$$

where:

- C_{LCDA} is the number of carbon atoms of the LCDA and can be 9, 10 or 13;

- Y_{LCDA} is the molar fraction of each LCDA on the total number of moles of LCDA;

- C_B is the number of carbon atoms of each diol component,

- Y_B is the molar fraction of each diol on the total number of moles of the diol component (B)

said AAPE having:

-a biodegradability after 90 days higher than 70%, with respect to pure cellulose according to the Standard ISO 14855

Amendment 1;

-a density of equal to or less than 1.20 g/cc;

- a number average molecular weight M_n of 40,000 - 140,000;
- an inherent viscosity of 0.8 - 1.5."

XI. The appellant's arguments can be summarised as follows:

- a) The main, first and second auxiliary requests should be admitted to the proceedings. The amendments contained in those requests were closely related to the request underlying the impugned decision and were meant to overcome the reasons for revoking the patent. Therefore they complied with Rule 80 EPC.

Main request

- b) The method of measuring the density was the same whether values of ≤ 1.2 or ≤ 1.20 were defined. Its absence in claim 1 therefore did not contravene the requirements of Article 123(2) EPC. Hence, the main request did not extend beyond the content of the application as filed.
- c) The experimental data of the patent, in particular Table 3, showed that the claimed amount of aromatic polyfunctional acid, namely from 50 to 60 mol%, defined a small window of polymer composition in which the biodegradability was above 70%. Above that amount a dramatic drop in biodegradability occurred- as shown by Comparative Example 4 using azelaic acid, terephthalic acid and butanediol- since the biodegradability did not vary linearly as a function of the content of units derived from aromatic polyfunctional acid. In contrast, Example 6 showed that the same repeating units gave a biodegradability higher

than 70% when the amount of aromatic acid was within the claimed range. Examples 5 and 7 using sebacic and brassylic acid, respectively, showed that the same range of units derived from aromatic polyfunctional acid provided a biodegradability higher than 70%.

- d) It was known that a higher content of aromatic polyfunctional acids in the polyester provided a higher degree of crystallinity and density, i.e. the resulting polyester was more structured and compact. As a consequence, the polymeric chains were less accessible to microorganisms and the polyester was therefore less accessible for enzymatic decomposition processes.
- e) It was also known that with a low amount of aromatic acid a good biodegradability could be achieved, but not in combination with good mechanical properties of the polymer. The problem to be solved was therefore to find an excellent balance of biodegradability and mechanical properties. Compositions of Examples 2 and 3 comprising less than 50% of aromatic acid were therefore marked as comparative in Table 3, despite the fact of achieving the required biodegradability. In addition the composition of (comparative) Example 3 did not contain the long chain carboxylic acid required by claim 1.
- f) The biodegradability was also influenced by the length of the carbon chain of the diol component, i.e. shorter carbon chains in the diol component increased the tendency of the polyester to crystallize, while longer carbon chains increased the hydrophobic character of the polyester. As

water was necessary in biodegradability processes, a balance had to be found between those two phenomena in order to obtain a high degree of biodegradability. Moreover, the biodegradability was in essence not affected by the viscosity and the molecular weight in the ranges defined in present claim 1.

- g) The degree of biodegradability defined in claim 1 as granted was therefore the consequence of the qualitative and quantitative composition of the polyester, as well as of the other physical and chemical parameters defined in the claim. Therefore, the deletion from granted claim 1 of the degree of biodegradability of the polyester did not offend against Article 123(3) EPC.

First auxiliary request

- h) The description of the application as filed provided a link between repeating units derived from terephthalic acid and a diol having 2, 3 or 4 carbon atoms, which were particularly preferred features of the polyester. Thus, the first auxiliary request met the requirements of Article 123(2) EPC. It also met those of Article 123(3) EPC for the same reasons as for the main request.

Second auxiliary request

- i) The feature defining the degree of biodegradability had been reinserted in claim 1 of the second auxiliary request in order to overcome the objection under Article 123(3) EPC. Claim 1 met the requirements of Article 123(2) EPC for the same reasons as the first auxiliary request.

Third auxiliary request

- j) The seventh auxiliary request submitted with letter of 18 June 2014 (promoted to third auxiliary request during the oral proceedings before the Board, before it was replaced by a new third auxiliary request) was admissible since it aimed at overcoming the objection under Article 123(2) EPC raised against the second auxiliary request in the Board's communication. For this purpose, it contained a more limited and specific definition of the diol component, based on original claim 6 and page 5, lines 6-14. The type of repeating units to be used for the polyester had been defined more specifically. Based on the known influence of the various parameters on the biodegradability indicated in relation to the main request (amount of aromatic (terephthalic) acid, type of diol) and the teaching provided by the examples of the patent in suit, the skilled person was able to prepare the claimed polyester without undue burden. The claims of the third auxiliary request therefore met the requirements of Article 83 EPC.
- k) The new third auxiliary request merely contained editorial amendments to overcome the Board's objection under Article 84 EPC that the former third auxiliary request (filed as seventh auxiliary request) lacked conciseness. For the same reasons as provided for that request it also met the requirements of Article 123(2), Article 123(3) and Article 83 EPC.

XII. The arguments of the respondent can be summarised as follows:

- a) The main, first and second auxiliary requests were late filed, as the Appellant had had ample opportunity to file such requests during the opposition proceedings but chose not to do so. Accordingly, the Appellant's main, first and second auxiliary requests should be rejected as inadmissible.
- b) Claim 1 of the main request contravened the requirements of Article 123(3) EPC, since the essential feature - the degree of biodegradability of the polyester - that provided a technical contribution to the subject-matter of the claims as granted had been deleted.
- c) The passage in paragraph [0023] of the opposed patent could not form a basis for amending the density value of 1.2 g/cc to 1.20 g/cc since in that paragraph the latter expression was associated with the feature that the density was measured with a specific machine, which feature was lacking in the amendment. Thus, claim 1 of the main request contravened Article 123(2) EPC.
- d) The same objections applied to the first auxiliary request. Furthermore, no basis had been indicated for the amendment of the number of carbon atoms of the diol component to "2, 3 or 4". The combination of that feature with the amendment that "the aromatic polyfunctional acid" was "terephthalic acid" was not explicitly disclosed in the application as filed, contrary to the requirements of Article 123(2) EPC.

- e) For the same reasons as for the first auxiliary request, the claims of the second auxiliary request did not meet the requirements of Article 123(2) EPC.

- f) None of the main, first and second auxiliary requests met the requirement of sufficiency of disclosure. In the notice of opposition and the submission of 30 April 2012 it had been explained in detail why the features "at least 90% of which is a long-chain dicarboxylic acid (LCDA) of natural origin selected from azelaic acid, sebacic acid, brassylic acid or mixtures thereof", "a density of equal to or less than 1.2 g/cc" and "an inherent viscosity of 0.8 -1.5" were not sufficiently disclosed. Since the claims of the first and the second auxiliary request contained those features, that argument also applied to them. Moreover, the claims that contained the requirement regarding the biodegradability had already been found to be insufficiently disclosed by the Opposition Division. Further arguments in that respect had also been provided with the notice of opposition and the subsequent submission of 30 April 2012. Hence, the claims of the second auxiliary request in which the feature of biodegradability had been reintroduced contravened Article 83 EPC.

XIII. The appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of the main request or of the first or second auxiliary request, all filed with the statement of grounds of appeal, or alternatively on the basis of the

claims of the third auxiliary request submitted during the oral proceedings.

- XIV. The respondent requested that the appeal be dismissed.
- XV. At the end of the oral proceedings, the decision of the Board was announced.

Reasons for the Decision

1. The appeal is admissible.

Non-appearance at oral proceedings

2. According to Article 15(3) of the Rules of Procedure of the Boards of Appeal (RPBA) the Board is not obliged to delay any step in the proceedings, including its decision, by reasons only of the absence at oral proceedings of any party duly summoned who may then be treated as relying only on its written case.

In deciding not to attend the oral proceedings (as announced by letter of 20 June 2014), the respondent, which, in the Board's communication of 4 June 2014, had been informed of the various issues to be discussed at the oral proceedings, chose not to avail themselves of the opportunity to present observations and counter-arguments orally but instead to rely solely on their written case. The respondent was to expect that during the oral proceedings the Board would consider the additional auxiliary requests submitted by the appellant with letter of 18 June 2014 and any arguments brought forward by the appellant not only with respect

to formal requirements, but also concerning the issue of sufficiency of disclosure, which had been addressed before the opposition division and in points 22 to 27 of the Board's communication. In the interest of the efficiency of the procedure the Board therefore took a final decision at the end of the oral proceedings on the case before it, notwithstanding the absence of the respondent who had been duly summoned.

Admissibility of the main, first and second auxiliary requests

3. Compared with the claims underlying the impugned decision, the claims of the present main request and first auxiliary request have been modified by specifying the upper limit of the density of the biodegradable polyester to be 1.20 g/cc instead of 1.2 g/cc.
- 3.1 According to the appellant (letter of 19 December 2013, page 2, "Main Request") that amendment has been introduced *inter alia* in order to exclude polyesters having a density value of 1.21 g/cc as obtained in comparative example 4 of the patent in suit (see table 4). It is also meant to define the set of properties of the polyester necessarily resulting in the degree of biodegradability required by claim 1 as granted, which degree is neither defined in claim 1 of the request underlying the contested decision, nor in the claims 1 of the present main and first auxiliary request. Therefore, the present definition of the density has the purpose of rendering redundant the definition of a degree of biodegradability after 90 days higher than 70% with respect to pure cellulose according to the Standard ISO 14855 Amendment 1, which definition had been present in claim 1 as granted and the deletion of which had been the basis for deciding that the amended

claims were not in keeping with the requirements of Article 123(3) EPC. Hence, the amendment concerning the density of the biodegradable polyester aims at overcoming the ground for the revocation of the patent.

3.2 The first auxiliary request defines in addition that the polyester contains 50 to 60 mol % of terephthalic acid and that the number of carbon atoms of each diol component C_B is 2, 3 or 4. Those amendments also aim at implicitly defining that the polyester of claim 1 necessarily exhibits a biodegradability of above 70 % as defined in the granted patent. Thus, the purpose of those additional amendments is also to remove the cause for the revocation of the patent in suit.

3.3 The same holds true for the second auxiliary request which not only contains all modifications present in the first auxiliary request, but in addition the feature defining the degree of biodegradability of the polyester, as in claim 1 as granted.

4. As to the question whether the appellant should have submitted those amendments before the first instance, the issue concerning Article 123(3) EPC arose for the first time in relation to a new main request submitted at the oral proceedings before the opposition division. That new main request had been submitted as a reaction to the conclusion of the opposition division that the requirement for a minimum degree of biodegradability of the copolyester resulted in claim 1 lacking sufficiency of disclosure.

4.1 In the annex to the summons to attend oral proceedings (points 6.4.1. to 6.4.3.) the opposition division had however initially expressed the preliminary view that the degree of biodegradability defined in claim 1 as

granted was the inevitable result of the other features defining the polyester of claim 1 as granted.

4.2 The change of mind of the opposition division was based on an analysis of the biodegradability values observed for polyesters according to examples 2-4 (comparative) and example 7 of the patent in suit (point 2.4 of the minutes). However, as also appears from the minutes, that comparison had not been discussed with the parties but was only mentioned by the opposition division when explaining the negative conclusion on sufficiency of disclosure they had arrived at during deliberation. In an attempt to overcome that objection, the proprietor then deleted the feature defining the degree of biodegradability, arguing that it was the consequence of the other properties of the polyester and was therefore in fact superfluous.

4.3 In view of the above, the filing only with the statement of grounds of appeal of the present main, first and second auxiliary requests cannot be seen as an abuse of the procedure. The filing of those claims with the statement of grounds of appeal is a legitimate reaction of a losing party that was confronted with a rather unforeseeable change of mind of the opposition division based on an essential argument that had not been brought to the attention of the parties before deliberation on the claims of the patent as granted. In view of the unforeseen situation, the patent proprietor could not reasonably be expected to provide an immediate reaction and submit an appropriately amended set of claims toward the end of the oral proceedings. The amendments submitted with the statement of grounds of appeal therefore constitute a fair attempt to overcome the objection of lack of sufficiency addressed in the opposition proceedings and the reasons for the

contested decision that the scope of protection had been extended.

5. Under those circumstances, the Board sees no reason to hold inadmissible the main, first and second auxiliary requests and they are therefore to be taken into account in the appeal proceedings (Article 12(4) RPBA).

Main Request

6. For Article 123(3) EPC the question needs to be answered whether the feature defining the degree of biodegradability is a limiting feature and whether its deletion leads to an extension of the scope of protection. In other words, does the polyester corresponding to the definition of present claim 1 necessarily exhibit the degree of biodegradability required by claim 1 as granted? For that purpose it is first necessary to consider the influence of the various structural features defining the polyester of claim 1 on its biodegradability.
 - 6.1 According to the appellant, a higher content of aromatic polyfunctional acids in the polyester provides a higher degree of crystallinity, the resulting polyester being more structured and compact, i.e. higher contents of aromatic polyfunctional acids lead to an increase of the density. As a consequence, the polymeric chains are less accessible to microorganisms and the polyester is therefore less prone to enzymatic decomposition processes. Those explanations are credible and in line with the influence of the aromatic polyfunctional acids on crystallinity reported in paragraphs [0003] and [0004] of the patent in suit. The biodegradability has also been indicated to be influenced by the length of the carbon chain of the

diol components, i.e. shorter carbon chains in the diol component increase the tendency of the polyester to crystallize, while longer carbon chains provide a more hydrophobic character to the polyester. As water is necessary in biodegradability processes, a balance has therefore to be found between those two phenomena in order to obtain a high degree of biodegradability. Moreover, in comparison with the content of aromatic polyfunctional acid and the length of the carbon chain of the diol, it is also credible that the viscosity and the molecular weight of the copolyester within the ranges defined in present claim 1 do not essentially affect its biodegradability.

- 6.2 As to the question whether the structural features defined in present claim 1 are sufficient to result in a biodegradability of 70%, a comparison of comparative example 4 and example 6 of the patent in suit, as referred to by the opposition division in point 2.3.3. of the minutes of the oral proceedings, is of interest.
- 6.3 The degree of biodegradability observed after 90 days of the polyester used in comparative example 4 of the patent in suit is - according to the appellant's statement during the oral proceedings before the opposition division - the same as after 49 days, namely about 10 to 11% (see point 2.3.3. of the minutes). That polyester comprises 61% units derived from terephthalic acid and 39% units derived from azelaic acid (both amounts based on the total amount of units derived from the acid component) and units derived from butanediol as the sole alcohol component. The polyester of comparative example 4 has a viscosity of 0,95 dl/g and a density of 1,21 g/cc. The composition of the polyester of example 6 which also is made of units derived from terephthalic acid, azelaic acid and

butanediol differs from that of comparative example 4 solely in that it contains 54% units derived from terephthalic acid. It has a viscosity of 1,04 dl/g and a density of 1,20 g/cc and exhibits a degree of biodegradability after 90 days of 82%. In view of the extremely low degree of biodegradability of the polyester of comparative example 4 which contains 61% units derived from terephthalic acid and has a density of 1,21 - i.e. values very close to the upper limits defined in present claim 1 - and the fact that the degree of biodegradability is essentially not affected by the viscosity in the claimed range (see point 6.1 above), it is doubtful whether all polyesters according to present claim 1 made of units derived from terephthalic acid, azelaic acid and butanediol, will exhibit a degree of biodegradability higher than 70%, as required by the claims as granted. This is even more questionable for corresponding polyesters containing units derived from brassylic acid instead of azelaic acid, since from tables 3 and 4 of the patent in suit (examples 6 and 7) it can be gathered that the substitution of brassylic acid for azelaic acid reduces density and biodegradability.

- 6.4 The appellant did not provide any evidence to support the argument that all polyesters corresponding to the definition of present claim 1, in particular those consisting of units derived from terephthalic acid, azelaic/brassylic acid and butanediol, always exhibited a degree of biodegradability higher than 70%. Even if it were considered credible, the - unsubstantiated - statement by the appellant during the oral proceedings that the degree of biodegradability did not vary linearly as a function of the content of aromatic polyfunctional acid units, cannot demonstrate that a non linear variation of the degree of biodegradability

would necessarily lead to a degree of biodegradability of more than 70%.

- 6.5 Since as shown above the appellant failed to provide convincing evidence that the amended definition of the polyester necessarily implies a degree of biodegradability of more than 70%, as was required by the claims as granted, the Board comes to the conclusion that the subject-matter of claim 1 of the main request extends the protection conferred by the patent in suit (in conformity with Case Law of the Boards of Appeal of the EPO, 7th edition 2013, II.E.5). Thus, the main request is contrary to the requirements of Article 123(3) EPC so that it cannot be allowed.

First auxiliary request

7. Claim 1 of the first auxiliary request differs from claim 1 of the main request in that the polyester contains 50 to 60 mol % of units derived from terephthalic acid and that the number of carbon atoms of each diol component C_B is 2, 3 or 4.
- 7.1 Those amendments do not exclude the polyesters according to claim 1 of the main request - containing units derived from terephthalic acid, azelaic/brassylic acid and butanediol - regarding which it could not be established that they always had a biodegradability of higher than 70%. Consequently, the subject-matter of claim 1 of the first auxiliary request also extends the protection conferred by the patent in suit (Article 123(3) EPC).
- 7.2 Moreover, claim 1 of the first auxiliary request also contravenes the requirements of Article 123(2) EPC. For the basis of the amendment regarding the number of

carbon atoms of each diol component, reference has been made to page 5, line 14 and claim 8 of the application as filed. Original claim 8 refers to the diols of claim 7 having from 2 to 4 carbon atoms. Claim 7 refers to claim 6 defining that the diol has from 2 to 10 carbon atoms. Claim 6 defines a list of specific diols, namely 1,2-ethandiol, 1,2-propandiol, 1,3-propandiol, 1,4-butanediol, 1,5-pentandiol, 1,6-hexandiol, 1,7-heptandiol, 1,8-octandiol, 1,9-nonandiol, 1,10-decandiol, 1,11-undecandiol, 1,12-dodecandiol, 1,13-tridecandiol, 1,4-cyclohexandimethanol, propylene glycol, neo-pentyl glycol, 2-methyl-1,3-propandiol, dianhydrosorbitol, dianhydromannitol, dianhydroditol, cyclohexandiol, and cyclohexanmethandiol, which list however does not contain all possible diols having from 2 to 10 carbon atoms. The diols defined in Claim 8 as filed are therefore restricted to those of claim 6 having 2 to 4 carbon atoms, i.e. 1,2-ethandiol, 1,2-propanediol, 1,3-propanediol, 1,4 butanediol and 2-methyl-1,3-propandiol. The same disclosure can be found in the passage on page 5, lines 6-15 of the application as filed. The application as filed therefore does not disclose the use of all diols having 3 or 4 carbon atoms, in particular not of 2,2-propanediol and 1,2- and 1,3-butanediol. Thus, the polyesters according to claim 1 of the first auxiliary request which can contain any unit derived from the general class of diols having 2, 3 or 4 carbon atoms, are not disclosed in the application as filed. Consequently, claim 1 of the first auxiliary request does not comply with the requirements of Article 123(2) EPC.

7.3 In view of the above, the first auxiliary request is also not allowable.

Second auxiliary request

8. Claim 1 of the second auxiliary request differs from claim 1 of the first auxiliary request in that it reinstates the requirement that the polyester has a degree of biodegradability higher than 70%. That amendment merely overcomes the deficiency with respect to the requirements set out in Article 123(3) EPC, but not that having regard to Article 123(2) EPC. The second auxiliary request is therefore not allowable.

Third auxiliary request

Admissibility

9. The third auxiliary request is based on the seventh auxiliary request submitted with appellant's letter of 18 June 2014. The filing of that seventh auxiliary request had been prompted by the Board's communication in which an objection under Article 123(2) EPC against the definition of the diol component in the second auxiliary request had been raised. During the oral proceedings that seventh auxiliary request was promoted to the appellant's third auxiliary request. After the Board had found that the amended definition of the diol component in said request lacked conciseness, the appellant submitted a new third auxiliary request in which the nature of the diol component to be used has not been amended, but its definition rendered more concise, namely "at least one diol component selected from the group consisting of 1,2-ethandiol, 1,2-propandiol, 1,3-propandiol, 1,4-butandiol and 2-methyl-1,3-propandiol".

Therefore, the submission of the new third auxiliary request during the oral proceedings constitutes a

timely and appropriate answer to the Board's objection under Article 84 EPC that does not change the nature of the debate concerning sufficiency of disclosure.

Therefore, the third auxiliary request submitted during the oral proceedings is admitted to the proceedings (Article 13(1) RPBA).

Rule 80 EPC

10. As shown in point 12 below the amendments to the granted patent introduced with the third auxiliary request aim at overcoming the objection of lack of sufficiency of disclosure with respect to the degree of biodegradability required by claims 1 and 10 as granted. Those amendments are therefore occasioned by a ground for opposition as required by Rule 80 EPC.

Article 123(2) EPC

11. Claim 1 as originally filed has been amended by limiting the definition of the aromatic polyfunctional acid and diol component to the preferred components, as disclosed in original claim 3 and on original page 4, lines 23-24 for terephthalic acid, and in original claim 8 and on original page 5, line 14 for the diol component (see also above point 7.2). The additional amendment of adding a zero after the value of 1.2 for the maximum value of the density is based on page 6, line 3 of the application as filed, where it is indicated that the polyesters have a density equal to or less than 1.20 g/cc. This is in line with the density values indicated in the experimental part of the patent in suit, in which the highest density value for examples according to the patent in suit is also 1.20 g/cc.

- 11.1 The respondent argued that the value of 1.20 indicated on page 6, line 3 of the description as filed was associated with a specific measurement method. However, there is no indication that other conventional measuring methods would lead to varying results. Therefore, it cannot be concluded that the addition of a zero after the value of 1.2 for the maximum value of the polyester density without indicating the measuring method contravenes the requirements of Article 123(2) EPC.
- 11.2 The deletion of original claim 10 which defined a degree of biodegradability higher than 80% is also not objectionable under Article 123(2) EPC.
- 11.3 The additional amendments to the claims consist of adaptations of the claims necessitated by the above mentioned amendments. Consequently, the claims according to the third auxiliary request meet the requirements of Article 123(2) EPC.

Article 123(3) EPC

12. Compared with claim 1 as granted, the present claims have been limited regarding the definition of the aromatic polyfunctional acid and the diol component, so that the scope of protection is not extended. The same holds true for the addition of a zero after 1.2, which amendment merely reflects the meaning indicated in the specification for the figure 1.2. Consequently, the requirements of Article 123(3) EPC are complied with.

Clarity

13. The Board is also satisfied that the amendments do not introduce any lack of clarity.

Sufficiency of disclosure

14. According to established jurisprudence the requirement of sufficiency of disclosure is met when the invention as defined in the claims can be performed by a skilled person using common general knowledge and having regard to further information given in the patent in suit. In this respect it is noted, in line with the reasoning adopted above with respect to Article 123(3) EPC, that the parameters defined in claim 1 constitute a limiting definition of the polyesters meeting the structural definition of that claim. The question in respect of sufficiency of disclosure is therefore whether or not the teaching of the patent in suit and the general knowledge allow the skilled person to prepare without undue burden the group of polyesters within the structural definition of claim 1 that also exhibit the required density, degree of biodegradability, viscosity and molecular weight.

14.1 The structural definition of the polyesters is now limited by specifying the aromatic polyfunctional acid to be terephthalic acid and the at least one diol component to be selected from 1,2-ethandiol, 1,2-propandiol, 1,3-propandiol, 1,4-butandiol and 2-methyl-1,3-propandiol. The long chain dicarboxylic acid should still be selected from azelaic acid, sebacic acid, brassylic acid or mixtures thereof. In addition, claim 1 does not only define a framework for the proportion of terephthalic acid in the acid component but with the inequality $(C_{LCDA} \cdot Y_{LCDA})/2 + C_B \cdot Y_B > 7.5$ it also provides a further rule of selection for choosing the number of carbon atoms of the diol component(s) as a function of the number of carbon atoms of the long-chain dicarboxylic acid.

14.2 For polyesters based on terephthalic acid, 1,4-butanediol and azelaic acid, sebacic acid and brassylic acid respectively, examples 1, 5, 6 and 7 of the patent in suit provide a specific teaching allowing to meet the parametric requirements of present claim 1, in particular with respect to the degree of biodegradability. In addition, the skilled person is aware of the influence of the content of units derived from terephthalic acid on the degree of biodegradability of the polyester and its density (see point 6.1 above). By varying the amount of repeating units derived from terephthalic acid, the skilled person would be able to adjust the required density and degree of biodegradability, while maintaining the viscosity and molecular weight requirements as set out in present claim 1 (see point 6.1 above).

15. Contrary to the view expressed by the opposition division during the oral proceedings (see point 2.4 of the minutes), the fact that the polyester according to comparative example 2 meets the requirement of density and biodegradability of claim 1, although it contains less than 50 mol% of terephthalic acid, does not indicate an insufficient teaching with respect to achieving the required degree of biodegradability. The polyester described in example 2 contains an amount of aromatic units that is below the minimum level of 50 mol% defined in claim 1, and is therefore correctly indicated as comparative. According to tables 1 and 2 and paragraph [0111], in line with the desiderata expressed in paragraph [0005] of the patent in suit, the minimum amount of 50 mol% is required to provide sufficient thermal and mechanical properties, but obviously not to provide the required minimum degree of biodegradability as follows from the known influence of

the amount of aromatic polyfunctional acid on crystallinity, density and biodegradability (see point 6.1 above). Example 4 contains more than 60% of units derived from an aromatic polyfunctional acid and does not meet the density and biodegradability requirement of present claim 1 for the same reasons indicated in point 6.1 above resulting in example 4 to be correctly indicated as comparative. Finally, the objection that the polyester according to example 7 did not fulfil the degree of biodegradability of at least 80% as defined in claim 10 of the granted patent is not relevant for the present third auxiliary request which does not contain a claim defining such minimum degree of biodegradability.

Therefore, the reasons provided by the opposition division during the oral proceedings for justifying its opinion concerning sufficiency of disclosure of the claims as granted do not put into question sufficiency of disclosure of the invention as now defined by the third auxiliary request.

16. The respondent's submissions concerning sufficiency of disclosure do not expressly specify the facts, arguments and evidence relied on in support of the objection for lack of sufficiency of disclosure, contrary to the requirements of Article 12(2) RPBA. They merely address the degree of biodegradability required by the claims, without indicating why it could not be achieved by the skilled person.
17. Thus, in view of the reasons given in above points 14 to 16 and the lack of arguments and evidence as to the contrary the Board is satisfied that the invention as defined in the claims of the third auxiliary request is disclosed in a manner sufficiently clear and complete

for it to be carried out by a skilled person.
Consequently, the objection of the respondent under
Article 83 EPC cannot succeed.

Remittal

18. Since the opposition division has not ruled on novelty and inventive step, the Board considers it appropriate to remit the case to the opposition division for deciding on the remaining issues (Article 111(1) EPC).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance for further prosecution on the basis of the third auxiliary request submitted during the oral proceedings.

The Registrar:

The Chairwoman:



B. ter Heijden

B. ter Laan

Decision electronically authenticated