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Datasheet for the decision of 9 May 2007

Case Number: T 0995/05 - 3.3.03

Application Number: 94830082.7

Publication Number: 0669369

IPC: C08L 3/02

Language of the proceedings: EN

Title of invention:
Starch based composition and process for making biodegradable packaging products

Patentee:
OBTUSA INVESTIMENTOS E GESTAO LIMIDADA

Opponent: NOVAMONT SPA

Headword: -

Relevant legal provisions:
EPC Art. 54, 56, 100(c), 108, 111(1), 123(2), 123(3)
EPC R. 57(a)
RPBA Art. 10b(1)

Keyword:
"Admissibility of appeal of Appellant II - (yes)"
"Extension of subject-matter (main request) - (yes)"
"Novelty (first auxiliary request) - (yes)"
"Inventive step (first auxiliary request) - (no)"
"Inventive step fifth (bis) auxiliary request (yes)"

Decisions cited:
G 0010/91, G 0001/95, T 0020/81, T 0248/85, T 0145/88, T 0513/90, T 0701/97, T 0355/99, T 0371/02, T 0064/03, T 0332/04

Catchword: -

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Case Number: T 0995/05 - 3.3.03

D E C I S I O N
of the Technical Board of Appeal 3.3.03
of 9 May 2007

Appellant I: (Opponent)
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Decision under appeal:
Interlocutory decision of the Opposition Division of the European Patent Office dated 7 June 2005 and posted 1 July 2005 concerning maintenance of European patent No. 0669369 in amended form.

Composition of the Board:

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

Summary of Facts and Submissions

I. The grant of the European patent No. 0 669 369 in the name of Obtusa Investimentos E Gestao Limidada in respect of European patent application No. 94 830 082.7, filed on 24 February 1994 was announced on 6 May 1999 (Bulletin 1999/18) on the basis of 19 claims.

Independent Claims 1, 8, 10, 14, 15, 17, and 18 read as follows:

"1. Starch-based composition for the production of biodegradable products, comprising in weight parts on total weight thereof:

- starch in an amount comprised between 96% and 99% in weight, said starch incorporating an amount of amylose comprised between 18% and 43% in weight on the total weight thereof;
- at least a weak acid or hydrochloric acid in an amount comprised between 0.2% and 2% in weight;
- at least a lipid in an amount comprised between 0.5% and 2% in weight;

characterized in that said at least one lipid is a vegetable oil chosen among the group comprising: peanut oil, maize oil, palm oil, and mixtures thereof.

8. Use of the composition according to any of claims 1 to 7, for the production of biodegradable shaped products.

10. Biodegradable low-density expanded shaped product obtainable by extrusion starting from a starch-based composition according to any of the claims 1 to 7 and having a bulk density comprised between 10 and 40 g/l, a resiliency of at least 30% and a compressibility comprised between 0.02 and 0.2 kN.

14. Process for the production of a biodegradable low-density expanded shaped product, comprising the steps of:

- mixing 96-99 parts in weight of a starch with 0.2-2 parts of at least a weak acid or hydrochloric acid and 0.5-2 parts of at least a lipid, thus obtaining an homogeneous mixture, said starch incorporating an amount of amylose comprised between 18% and 43% in weight on the total weight thereof;
- submitting to gelation said mixture by means of mechanical working in an extrusion chamber of an extrusion device at a pre-established pressure;
- extruding said gel-like mixture through a die of a prefixed shape, thus obtaining a low-density expanded product;

characterized in that it comprises the preliminary step of premixing said starch with said at least one lipid.

15. Process for the production of a biodegradable low-density expanded shaped product according to any of the claims 10 to 13, comprising the steps of:

- mixing 96-99 parts in weight of a starch with 0.2-2 parts of at least a weak acid or hydrochloric acid and 0.5-2 parts of at

least a lipid chosen among the group comprising:
peanut oil, maize oil, palm oil, and mixtures thereof, thus obtaining an homogeneous mixture, said starch incorporating an amount of amylose comprised between 18% and 43% in weight on the total weight thereof;

– submitting to gelation said mixture by means of mechanical working in an extrusion chamber of an extrusion device at a pre-established pressure;

– extruding said gel-like mixture through a die of a prefixed shape, thus obtaining a low-density expanded product.

17. Use of a lipid as amylose protecting-agent in a starch-based composition for the production of biodegradable products, to prevent excessive dextrinization of amylose and recrystallization of starch.

18. Use of a lipid as damp protecting-agent in a starch-based composition for preventing penetration of humidity into the inside of a biodegradable product obtainable by said composition and its degradation."

Claims 2 to 7, 9, 11 to 13, and 16 and 19 were dependent claims.

II. On 4 February 2000, a Notice of Opposition was filed by Novamont S.p.A in which revocation of the patent in its entirety was requested on the grounds of lack of

novelty and lack of inventive step (Article 100(a) EPC), and extension of subject-matter (Article 100(c) EPC).

The objections were supported *inter alia* by the following documents:
D1: EP-A-0 282 451;
D2: WO-A-9208759;
D4: Kirk-Othmer Encyclopaedia of Chemical Technology, Vol. 9, 1980, pages 798, 804 and 805;
D5: Table of Unichema International;
D7: US-A-5 252 271; and
D10: EP-A-0 409 783.

III. By a decision announced orally on 9 January 2002 and issued in writing on 18 February 2002 the Opposition Division held that the grounds of opposition did not prejudice the maintenance of the patent in amended form on the basis of the first auxiliary request submitted at the oral proceedings and consisting of 18 Claims. Independent Claims 1 and 15 thereof differed from granted Claims 1 and 15 only in that the expression "among the group comprising peanut oil, palm oil, maize oil, and mixtures thereof" had been replaced by the expression "among the group consisting of peanut oil, palm oil, maize oil, and mixtures thereof". Dependent Claims 2 to 13, 16 corresponded to granted Claims 2 to 13, 16 as granted.
Independent Claim 14 differed from Claim 14 as granted only in that the expression "before the addition of said at least a weak acid or hydrochloric acid" had been added at the end of the characterizing part of the claim. Independent Claim 17 differed from granted Claim 18 in that features concerning the starch

composition had been incorporated therein. Claim 18 corresponded to Claim 19 as granted.
The decision held, in particular, that the subject-matter of Claim 1 was novel over documents D1 and D2 (cf. point 2.6 of the decision).

IV. A Notice of Appeal was filed on 12 April 2002 by the Appellant (Opponent), with simultaneous payment of the prescribed fee. With the Statement of Grounds of Appeal filed on 18 June 2002, the Appellant submitted a new document referred to as D15 (EP-A-0 474 095).

V. In its decision T 371/02 of 26 November 2003, the Board of Appeal considered that document D15 was sufficiently relevant to be admitted into the proceedings. It thus decided to set aside the decision under appeal and to remit the case to the first instance for further prosecution.

VI. By an interlocutory decision announced orally on 7 June 2005 and issued in writing on 1 July 2005, the Opposition Division decided to maintain the patent in amended form.

VII. The decision of the Opposition Division was based on a main request consisting of 18 claims, and on a first auxiliary request consisting of one claim as submitted during the oral proceedings of 7 June 2005.

Claims 1 to 18 of the main request corresponded to Claims 1 to 18 of the first auxiliary request on which the Opposition Division had decided in its decision of 9 January 2002 that the patent could be maintained.

The only claim of the first auxiliary request corresponded to Claim 14 of the main request.

In its decision, the Opposition Division held that document D15 would represent the closest state of the art for the subject-matter of Claim 1 of the main request, since it disclosed the extrusion of low density expanded products from compositions comprising a starch, an acid like citric acid, and oils or fat in order to improve the water resistance. According to the decision, starting from D15, the technical problem had to be seen in the provision of a composition for the production of biodegradable low density expanded products capable of resisting to the attack of humidity. According to the decision, since the Patent Proprietor had not provided adequate evidence that either the amount of lipids or the specific oils selected were critical to the obtaining of a particular effect, the subject-matter of Claim 1 had to be considered as obvious over D15.

Concerning the auxiliary request, the Opposition Division did not admit into the proceedings the ground of opposition under Article 100(c) EPC raised by the Opponent against Claim 1 of the auxiliary request at the oral proceedings of 7 June 2005.
Concerning inventive step of the subject-matter of the Claim of the auxiliary request, D15 was considered as the closest state of the art. According to the decision the difference between the subject-matter of the claim and D15 was that the starch had to be premixed with the lipid before adding the acid. According to the decision, this process step avoided excessive dextrinisation of the starch and subsequent recrystallization of the

starch which would have led to a product being hard and brittle.
The technical problem was hence be seen as being to provide a process for the production of a biodegradable low density expanded shaped product capable of keeping its mechanical properties in the long run, thus avoiding hardening and friability due to a progressive hardening of starch.
The decision held that there was no indication either in D15 or in the other documents cited to use a premixing step to solve this problem. Consequently, the subject-matter of the claim of the auxiliary request was considered as meeting the requirements of Article 56 EPC.

VIII. Two Notices of Appeal were filed as follows:

(i) on 1 August 2005 by the Opponent (Appellant I), and

(ii) on 12 September 2005 by the Patent Proprietor (Appellant II).

The prescribed fees were paid on the same day, respectively.

IX. In the Statement of Grounds of Appeal filed on 10 November 2005, Appellant I argued essentially as follows:

(i) Concerning inventive step of the subject-matter of the claim of the auxiliary request:

(i.1) The difference between the subject matter of the claim and D15 consisted only in the premixing step

recited in characterising feature d), in the amount of lipid, and in the amount of starch.

(i.2) In Example 1 of D15, the amount of starch added was however 95.4% by weight, i.e. very close to the claimed range of 96-99% by weight.

(i.3) D15 mentioned the possibility of either mixing the raw material with all additives before extrusion or to add all the components together in the extruder (column 4, lines 35-41).

(i.4) The Opposition Division had considered that none of the cited documents taught to premix starch with a lipid.

(i.5) This was, in the Appellant's view, however not correct.

(i.6) Document D2 described expanded low-density solid products which were environmentally biodegradable and resilient foamed products useful as loose fill packaging material and a process for their preparation.

(i.7) D2 described steps b) and d) of the claimed process (page 6, first full paragraph and paragraph bridging pages 7 and 8). It hence disclosed the pre-characterising part of the claim.

(i.8) D2 in its Example 3 explicitly taught the pre-mixing of starch with a lipid prior to the addition to the mixture to be processed of the component namely water, which in the subsequent extrusion step under the

action of shear forces, could cause the hydrolytic attack of starch.

(i.9) The description of D2 also contemplated the addition of acids in amounts of from 0.1% to about 4% referred to the polysaccharide component.

(i.10) The teaching of the patent would appear to be that the starch and the lipid were to be pre-mixed before the addition of the component which under extrusion conditions caused dextrinisation of starch.

(i.11) The same teaching was provided by D2.

(i.12) Furthermore, Example 5 of D2 contemplated the addition of the acid (citric acid) together with the lipid before the addition of water. Citric acid was a crystalline solid material which clearly could not cause any hydrolytic attack in the absence of water.

(i.13) Since D2 dealt with the same technical problem as defined by the Opposition Division in its decision, the teaching of D2 could directly be combined with the teaching of D15.

(i.14) Consequently, the subject-matter of the claim lacked inventive step over D15 in view of D2.

(i.15) The subject-matter of the claim also lacked inventive step in view of the combination of D15 with D10 which taught to add a lubricant, before the destructurization process, which, as indicated in Dl might provide for the reduction of the mass average molar mass of the starch, i.e. premixing the lipid with

starch prior to subjecting the starch to process conditions causing dextrinisation.

(i.16) D2 could also be considered as the closest prior art.

(i.17) The claimed process differed from D2 only in that starch and the lipid were premixed before the addition of the acid.

(i.18) However, D2 taught the same pre-mixing step before the addition of the water component and before subjecting the starch to the process conditions which caused dextrinisation.

(i.19) Even if it were true that the pre-mixing of the starch with the lipid would protect the starch from the hydrolytic attack of the acid, the process of D2 must equally protect the starch from the hydrolytic attack.

(i.20) Thus, the difference between the process of D2 and the claimed process did not at all contribute causally to the solution of a technical problem over D2.

(i.21) It was established case law of the EPO that if the technical problem only consisted in providing an alternative way of achieving the same result, then all alternatives were equally obvious and none might involve an inventive step.

(i.22) Therefore, the subject-matter of the claim lacked inventive step over D2, in view of the common general knowledge of the man skilled in the art.

(ii) Concerning Article 123(2) EPC:

(ii.1) The objection of lack of compliance with Article 123(2) EPC of the claim of the auxiliary request had been considered by the Opposition Division as a fresh ground for opposition and dismissed, since it had not been considered as *prima facie* relevant.

(ii.2) The definition of the process was given on page 9, lines 14-29 of the original description application and referred to the production of a biodegradable low-density expanded shaped product having a bulk density between 10 and 40 g/l, a resiliency of at least 30% and a compressibility between 0.02 and O.2O kN.

(ii.3) Claim 14 of the application as filed referred to the process for the production of a biodegradable low-density expanded shaped product according to any of Claims 10 to 13.

(ii.4) Claim 10 of the application as filed contained the same bulk density, resiliency and compressibility limitations as mentioned in the description as filed.

(ii.5) The claim of the auxiliary request did not recite the bulk density, the resiliency and the compressibility of the product. This represented an inadmissible generalization.

(ii.6) In the decision under appeal, it had been considered that these limitations were inherent to the product obtained by the claimed process.

Reference had been made in that respect to page 11, lines 7 to 10 of the application as filed.

(ii.7) However this passage referred to special and advantageous features of the process described on page 10, lines 2 to 28.

(ii.8) None of the above-mentioned specific features were mentioned in the claim.

(ii.9) Consequently, the bulk density, resiliency and compressibility limitations could not be considered as inherent to the product obtained by the claimed process.

(ii.10) The claim was *prima facie* open to the production of a wide range of biodegradable low-density expanded shaped products.

(ii.11) Based on common general knowledge, it was simply not technically credible that the extrusion of the composition defined in the claim would inevitably lead to an expanded product, having the required bulk density, resiliency and compressibility features.

X. With the Statement of Grounds of Appeal filed on 11 November 2005, Appellant II submitted a retyped version of the main request considered by the Opposition Division at the oral proceedings of 7 June 2005 as well as four new auxiliary requests and an experimental report.

It also argued essentially as follows concerning inventive step of the main request:

(i) The subject-matter disclosed in D15 differed from the invention claimed in the opposed patent by the following features:

(1) the amount of starch;
(2) the amylose content;
(3) the amount of oil, and
(4) the type of oil.

(ii) Comparative tests had been performed in order to demonstrate the advantages of the claimed compositions over those according to D15 (cf. annexed experimental report).

(iii) The sample identified as "Obtusa 1 M 100" fell within Claim 1 of the main request and also within Claims 1 of auxiliary requests 1 to 3, the sample identified as "Obtusa 1 M 300" was outside the scope of the main request in that it had a lower amylose content; the sample identified as "Confronto M 100" was outside the scope of the main request in that it had a higher lipid content and the sample identified as "Confronto M 300" was outside the scope of the main request in that it had both a lower amylose content and a higher lipid content.

(iv) The comparison showed that the sample according to the invention had a "sponge like structure" which resulted in a better ability to absorb stresses than the other samples.

(v) It further showed that the sample according to the invention had a better ability than the other samples to regain its original structure after a stress.

(vi) Consequently, the amount of lipid and/or the amylose content were critical to the obtaining of these structural and mechanical properties.

(vii) Since the prior art did not provide any indication that these technical effects could be achieved, acknowledgment of inventive step would be fully justified.

XI. With its letter dated 17 March 2006, Appellant II submitted 9 auxiliary requests which replaced the auxiliary requests then on file and a new experimental report (in Italian). It also argued essentially as follows:

(i) The new experimental report showed that premixing the starch and the lipid before the acid addition gave clear advantages (less rigid, less susceptible to breakage) over products obtained without such premixing.

(ii) The obtaining of these advantages was not suggested in the cited prior art.

XII. With its letter dated 27 March 2006, Appellant II submitted an English translation of the experimental report filed with the letter dated 17 March 2006 and a new experimental report. It also argued essentially as follows:

(i) Since in the first experimental report, the mixtures which had been subjected to the gelation step probably presented different degrees of homogeneity, it had been necessary to file new comparative data.

(ii) The new experimental report showed that product obtained by premixing starch with the lipid were significantly less rigid and more elastic than those obtained by mixing starch, lipid and acid at the same time.

XIII. With its letter dated 29 May 2006, Appellant I submitted the following document:
Annex 1: Calvin J. Benning, "Plastics Foams: the physics and chemistry of product performance and process technology, Volume II: Structure, Properties, and Applications"; Wiley Interscience, 1969; pages 11, 13-16.

It also requested:
1) that the appeal filed by the patentee be considered as inadmissible;
2) that the experimental evidence submitted by the patentee with the statement of the grounds for appeal, as well as the additional experimental evidence filed by the patentee with letters of 17 and 27 March 2006 not be entered in the appeal proceedings, since late filed and irrelevant;
3) in case that none of the above requests 1) and 2) was accepted by the Board, that the case be remitted to the Opposition Division for consideration of the above-mentioned late filed evidence;
4) in case that none of requests 1) to 3) was accepted, that the appeal be rejected as "ungrounded"; and

5) that the patent be revoked in its full extent, as submitted with the Notice of appeal.

The arguments presented by Appellant I in this letter may be summarized as follows:

(i) Concerning the admissibility of the appeal by Appellant II:

(i.1) The statement of the grounds for appeal filed by the patentee did not contain any reason why the contested decision should be set aside, but simply referred to new experimental evidence which was not on file in the opposition procedure.

(i.2) In the decision under appeal, the technical problem was defined as to provide a composition for the production of biodegradable low-density expanded shaped products capable of resisting to the attack of humidity.

(i.3) The statement of grounds of appeal only related to an alleged improved compressibility behaviour of loose fill packaging materials according to the alleged invention, resulting from the use of the claimed amount of lipid, amylose content and amount of starch.

(i.4) Consequently, the statement of the grounds simply raised a new issue (alleged improved compressibility behaviour), which had nothing to do with the reasons on which the decision was based.

(i.5) Consequently, the appeal of Appellant II did not comply with Article 108 EPC.

(ii) Concerning the experimental evidence submitted by Appellant II with its letters dated 17 and 27 March 2006:

(ii.1) These experimental evidence had to be regarded as late filed.

(ii.2) The experimental evidence was *prima facie* irrelevant, due to the fact that it was totally unrelated with the grounds on which the contested decision was based.

(ii.3) If there were admitted in the appeal proceedings, this would lead to a total change in the factual framework and therefore to an entirely fresh case.

(ii.4) The granting of the request that the late filed evidence not be entered in the proceedings would lead to the inevitable consequence that the appeal filed by the patentee was devoid of anything which could be regarded as a statement of grounds for appeal, whereby the appeal should be rejected as inadmissible.

(iii) Concerning remittal of the case to the Opposition Division:

(iii.1) The late filed evidence raised a new issue relating to alleged improved mechanical properties of the claimed product, which had not been considered by the Opposition Division.

(iii.2) This inevitably required further investigation as to the identification of the closest prior art and a definition of the technical problem.

(iv) Concerning the main request of Appellant II:

(iv.1) With letter dated 18 June 2002, a statement of the grounds for appeal had been filed against the interlocutory decision of the Opposition Division of 18 February 2002.

(iv.2) It was requested that the quoted statement of the grounds for appeal be introduced in the present appeal procedure.

(iv.3) The subject-matter of Claim 1 of the main request lacked novelty over D1 (page 4, lines 51 to 54) and D2 (page 11, lines 12 to 16), since Claim 1 included within its scope "mixtures of peanut oil, maize oil and palm oil", and a lipid component which was any mixture of triglycerides (cf. also documents D4 and D5).

(iv.4) The subject-matter of Claim 10 lacked novelty over document D7 (cf. column 6, lines 64 to 65) since in view of the word "obtainable" used in the language of Claim 10, there was no limitation as to the starch composition used for obtaining the claimed product.

(iv.5) Concerning inventive step of the subject-matter of Claim 1:

(iv.6.1) Appellant I concurred with the arguments set out in the contested decision by the Opposition Division in connection with Claim 1 in view of D15 as closest state of the art.

(iv.6.2) The experimental report submitted by Appellant II was not suitable to provide evidence that the amount of oils and the type of oils to be added to the starch would be critical to the obtainment of the technical effect of improved resistance to humidity.

(iv.6.3) Due to the lack of information concerning the process by which the tested packaging materials had been obtained, there was no possibility of verification for Appellant I.

(iv.6.4) Samples OBTUSA 1 M 300 and CONFRONTO M 300 were irrelevant, since the amylose content could not be considered as a distinguishing feature over D15.

(iv.6.5) Moreover, the experimental tests did not disclose the water content of the starch material which was used.

(iv.6.6) The comparison between the samples OBTUSA 1 M 100 and CONFRONTO M 300 was irrelevant since the amounts of citric acid and palm oil were changed.

(iv.6.7) The amount of acid was not a distinguishing feature over D15.

(iv.6.8) The claimed amount of the lipid thoroughly overlapped with that disclosed by Dl and D2.

(iv.6.9) The compressibility tests in the experimental report were not reliable because even a small difference in size and shape of the loose fill packaging products would indeed affect the results.

(iv.6.10) The declared "sponge-like structure" was in contradiction with the aims of the invention as defined in the original application.

(iv.6.11) The original patent specification indicated that the invention aimed at providing expanded products having structure and mechanical characteristics comparable to those of expanded polystyrene (page 4, lines 10-16); expanded polystyrene generally had a closed cell structure (cf. Annex 1, page 15, table II), while the term "sponge" generally designated an expanded material having predominantly open cells communicating with each other (cf. Annex 1, page 13).

(iv.6.12) D2 might also be regarded as the closest state of the art.

(iv.6.13) D2 taught to use a lipid to retard the evaporation of water from the starch composition, i.e. of the transfer of moisture.

(iv.6.14) In that respect, the same mass transfer coefficient would apply for the penetration of humidity as for the evaporation of water.

(iv.6.15) Thus, the problem of penetration of humidity had already been solved by D2.

(iv.6.16) Consequently, the technical problem could only be seen in providing alternative lipids to those proposed in D2 (for example soybean oil).

(iv.6.17) Since D2 disclosed the use of C_{12}-C_{18} triglycerides and of soybean oil, the use of the claimed oils did not involve any inventive step.

(iv.7) Independent Claims 8, 10, 15 and 17 clearly lacked inventive step over D15 for the same reasons explained in the interlocutory decision of the Opposition Division of 1 July 2005 with reference to claim 1.

(iv.8) Concerning Claim 14, the experimental evidence filed by the patentee with letters of 17 and 27 March 2006 was irrelevant, since it was not related to the technical problem of providing a product capable of keeping its mechanical properties in the long run, or with the problem of providing a product having an improved resistance against the attack of humidity.

(iv.9) The only conclusion which could be derived by comparing the tests submitted by the patentee with letter of 17 March with those submitted with letter of 27 March was that the degree of mixing and the homogeneity of the material had a strong influence on the final properties of the expanded products.

XIV. The arguments submitted by Appellant II in its letter dated 11 July 2006 may be summarized as follows:

(i) Concerning the admissibility of the appeal:

(i.1) As indicated in paragraph [0080] of the opposed patent, the claimed products should present numerous advantages over the prior art, such as:

possibility of realizing biodegradable products, good structural and mechanical characteristics, and capacity of keeping shape and mechanical properties with the passing of time, resisting the hydrolytic attack of humidity.

(i.2) The experimental report filed with the Statement of Grounds of Appeal had demonstrated that the claimed products surprisingly had better structural and mechanical properties than those disclosed by D15, and that the opinion of the Opposition Division was not correct.

(i.3) The appeal filed by the patentee was thus perfectly admissible.

(ii) Concerning the late filed evidence:

(ii.1) It was only after the receipt of the grounds of appeal filed by Appellant I, that it was decided to perform additional tests in order to rebut the arguments presented by Appellant I.

(ii.2) The experimental reports filed with letters of 17 and 27 March 2006 were thus also admissible.

XV. With its letter dated 5 March 2007, Appellant II submitted a new main request and nine auxiliary requests, referred to first, second, third, fourth, fourth (bis), fifth, fifth (bis), sixth and sixth (bis) auxiliary requests.

Claims 1 to 18 of the main request corresponded to Claims 1 to 18 of the main request on which the decision of the was based (cf. Section VII above).

Claims 1 to 7 of the fifth (bis) auxiliary request read as follows:

"1. Process for the production of a biodegradable low-density expanded shaped product having a bulk density comprised between 10 and 40 g/l, a resiliency of at least 30% and a compressibility comprised between 0.02 and 0.2 kN, comprising the steps of:
- mixing 96-99 parts in weight of a starch with 0.2-2 parts of at least a weak acid or hydrochloric acid and 0.5-2 parts of at least a lipid, thus obtaining an homogeneous mixture, said starch incorporating an amount of amylose comprised between 18% and 43% in weight on the total weight thereof;
- submitting to gelation said mixture by means of mechanical working in an extrusion chamber of an extrusion device at a pre-established pressure;
- extruding said gel-like mixture through a die of a pre-fixed shape, thus obtaining a low-density expanded product;
characterized in that it also comprises the preliminary step of premixing said starch with said at least one lipid, before the addition of said at least a weak acid or hydrochloric acid.

2. Process according to claim 1, characterized in that the starch is a common starch chosen among the group comprising: corn starch, leguminous plants starch, tubers, and mixtures thereof.

3. Process according to claim 1, characterized in that the amylose content of said starch is comprised between 24% and 36% in weight on the total weight thereof.

4. Process according to claim 1, characterized in that said at least a weak acid is comprised in an amount between 0.5% and 1% in weight.

5. Process according to claim 1, characterized in that said at least one weak acid is an acid chosen among the group comprising: malic acid, tartaric acid, citric acid, maleic acid, succinic acid, acetic acid, and mixtures thereof.

6. Process according to claim 1, characterized in that said at least one lipid is comprised in an amount between 0.5% and 1.5% in weight.

7. Process according to claim 1, characterized in that said at least one lipid is a vegetable oil chosen among the group consisting of: peanut oil, maize oil, palm oil, and mixtures thereof."

XVI. Oral proceedings were held before the Board on 9 May 2007.

(i) At the oral proceedings, the discussion firstly focussed on the question of admissibility of the appeal of Appellant II, the question of the admission of the experimental data submitted by Appellant II with its Statement of Grounds of Appeal. In these respects, the Parties reiterated the arguments presented during the written phase of the appeal.

(ii) The Board having informed the Parties that the appeal of Appellant II was considered as admissible and that the experimental report submitted by Appellant II with its Statement of Grounds of Appeal was admitted into the proceedings, the discussion moved to the question of the admission of the experimental reports submitted by Appellant II with its letters dated 17 and 27 March 2006 into the proceedings and the question of the remittal of the case to the Opposition Division as requested by Appellant I in its letter dated 29 May 2006 (section XIII.3), above).

Appellant I indicated that it no longer opposed the introduction of the experimental reports filed in March 2006 by Appellant II but maintained its request for remittal to the first instance since the issue of the mechanical properties raised by Appellant II in view of the experimental reports submitted during the appeal proceedings had not been considered by the Opposition Division. Appellant II submitted that Appellant I had had enough time for examining these experimental reports and for carrying out its own counter experiments, and that the question of the mechanical properties had already been part of the opposition proceedings, so that a remittal would not be justified.

(iii) The Board, after deliberation having informed the Parties, that on the basis of the request formulated by the Appellant I in its letter dated 29 May 2006, it was not prepared to remit the case to the first instance, the discussion moved to the questions as to whether Claim 14 of the main request was open to objection under Article 100(c) EPC, and if so as to whether this

claim complied with the requirements of Article 123(2) EPC.

While the Parties essentially relied on the arguments presented in the written phase of the appeal in that respect, they made additional submissions which may be summarized as follows:

(iii.1) By Appellant I:

(iii.1.1) The ground of opposition under Article 100(c) EPC had been mentioned in the Notice of Appeal, even if admittedly not directed to granted Claim 14.

(iii.1.2) Contrary to the findings of the Opposition Division, it was *prima facie* evident that Claim 14 of the main request did not comply with the requirements of Article 123(2) EPC, since the product obtained by the claimed process would not inevitably meet the requirements in terms of bulk density, compressibility and resiliency set out in the application as filed.

(iii.2) By Appellant II:

(iii.1.1) The objection against Claim 1 of the first auxiliary request, which corresponded in substance to Claim 14 as granted, had been raised at the end of the oral proceedings before the Opposition Division.

(iii.1.2) This represented a new ground of opposition. Reference was made to the decision G 1/95 (OJ EPO, 1996, 615) in that respect.

(iii.1.3) It was clear from the application as originally filed that the claimed process inherently

led to a product having the required bulk density, compressibility, and resiliency.

(iii.1.4) The burden of the proof was on Appellant I to show that the process did not inevitably lead to the products having the required properties.

(iii.1.5) Should this new ground be admitted, it was requested that the case be remitted to the first instance.

(iv) After deliberation, the Board informed the Parties that Article 100(c) EPC was part of the procedure, that Claim 14 of the main request would appear as infringing Article 123(2) EPC, and that a similar consideration would apply to the respective Claim 13 of the first and second auxiliary requests and to the respective Claim 1 of the fourth, fifth and sixth auxiliary requests.
Appellant II then dropped its first auxiliary request and submitted a new first auxiliary request.
This new first auxiliary request differed from the main request only in that Claim 14 of the main request had been deleted, and in that the remaining claims had been accordingly renumbered.
While Appellant I requested that this late filed request be not admitted into the proceedings, Appellant II referred to Article 10(b) of the Rules of Procedure of the Boards of Appeal (RPBA) and submitted that the new request differed from the main request only by the deletion of the objected Claim 14, so that it added no complexity, and that it should be hence admitted.

(v) After deliberation, the Board having informed the Parties that the new first auxiliary request would be admitted into the proceedings, the discussion moved to the substantive examination of this request. The arguments presented by the Parties in that respect may be summarized as follows:

(v.1): By Appellant I:

(v.1.1) The subject-matter of Claim 1 lacked novelty over D1 and D2, since the lipid defined in Claim 1 could be any possible mixtures of triglycerides.

(v.1.2) Document D7 would be novelty destroying for the subject-matter of Claim 10.

(v.1.3) The compressibility value indicated in Claim 10 had not been determined according a standard method. It was not possible to compare this value with those disclosed in the prior art.

(v.1.4) The test used for compressibility in the patent in suit was not reliable, since it did take into account the contact surface of the filling elements, since the result was expressed in Newton. This feature could not be used as characterizing feature.

(v.1.5) Concerning inventive step, Appellant I, while relying essentially on its submissions made in the written phase of the appeal, further submitted that the comparative data annexed to the Statement of Grounds of Appeal of Appellant II were irrelevant for showing an effect over the compositions of D15 and D2, since the compression test used could not demonstrate an

improvement of mechanical properties because of its lack of significance, since the amount of water used in the manufacture of the samples was not indicated and since the amylose content had not been considered as distinguishing feature over the cited prior art.

(v.2) By Appellant II:

(v.2.1) The question of novelty over D1 and D2 should not be part of the present appeal proceedings.

(v.2.2) In its decision T 371/02, the Board had not contested the findings of the opposition division in its first interlocutory decision concerning the novelty of the claimed subject-matter over D1 and D2. If the Board would have found that these documents destroyed the novelty of the claimed subject-matter, there would have been no need to remit the case to the Opposition Division for examining inventive step in view the newly introduced document D15.

(v.2.3) In the Statement of Grounds of Appeal of Appellant I the question of novelty over D1 and D2 had not been mentioned.

(v.2.4) The Board having informed the Parties that the issue of lack of novelty based on documents D1 and D2 would be part of the proceedings, Appellant II essentially mentioned the following points in that respect:

(v.2.4.1) Documents D1 and D2 did not disclose the amount of acid as set out in Claim 1.

(v.2.4.2) D1 and D2 did not disclose the specific composition of the lipid as set out in Claim 1.

(v.2.5) Concerning Claim 10, it was clear that D7 did not disclose the bulk density or the compressibility of the claimed product.

(v.2.6) Concerning inventive step, Appellant II, in addition to the arguments presented in the written phase, essentially made the following additional submissions:

(v.2.6.1) The tests submitted with the Statement of Grounds of Appeal clearly showed the better stress absorbency of the products made from the claimed compositions.

(v.2.6.2) In order to obtain expanded articles from the starch compositions, it was necessary to add water. It was hence evident that the amount of water added needed to be the same for sake of comparison between the different samples tested.

(vi) The Board, after deliberation, having informed the Parties that the new first auxiliary request was considered as not allowable, and Appellant I having raised objections under Article 123(3) EPC against the fourth (bis) auxiliary request, Appellant II indicated that it withdrew the fourth (bis) auxiliary request as well as the second, the third, the fourth, the fifth, and the sixth auxiliary requests submitted with letter dated 5 March 2007. The discussion then focussed on the fifth (bis) auxiliary request (section XV, above). The

arguments presented by the Parties in that respect may be summarized as follows:

(vi.1) By Appellant I:

(vi.1.1) Claims 2 to 7 of the request contravened Rule 57(a) EPC, since they had no counterpart in the claims as granted and since their filing was not justified by the grounds of opposition.

(vi.1.2) Concerning inventive step:

(vi.1.2.1) Document D2 would represent the closest state of the art.

(vi.1.2.2) Its aim was also to provide fill materials which retained its resiliency and ability to withstand repeated shock and showed no tendency to break up into fine.

(vi.1.2.3) In Example 5 of D2, although lipid and the citric acid were added at the same time to the starch, it should be noted that citric acid was in solid form. Consequently, the dextrinisation could only start when water was added.

(vi.1.2.4) Thus, the solution proposed by the patent in suit (i.e. premixing step) would represent a mere alternative.

(vi.2) By Appellant II

(vi.2.1) In Example 3 of D2 no acid had been added. Furthermore in Examples 3 and 5 of D2 the amount of

lipid was much less than required by the process according to the patent in suit.

(vi.2.2) There was no indication in D2 that excessive dextrinisation could be avoided by premixing a lipid with the starch.

(vi.2.3) The line of arguments presented by Appellant I was hence clearly based on an ex post facto analysis.

XVII. Appellant I requested that the decision under appeal be set aside and that the European patent No. 669 369 be revoked.

Appellant II requested that the decision under appeal be set aside and the patent be maintained on the basis of the main request, filed with letter dated 5 March 2007, or in the alternative on the basis of the first auxiliary request, filed at the oral proceedings, 5th (bis) or 6th (bis) auxiliary requests filed with letter dated 5 March 2007.

Reasons for the Decision

1. The appeal of Appellant I is admissible.

2. *Admissibility of the appeal of Appellant II*

2.1 As indicated above in Section XIII, Appellant I requested that the appeal filed by Appellant II be ruled inadmissible.

2.2 The Board firstly observes that the notice of appeal of Appellant II was filed and the appeal fee was paid within the time period as set out in Article 108 EPC, first and second sentences. The appeal also complies with Articles 106 and 107 and with Rule 1, paragraph 1, and Rule 64(b) EPC.

2.3 Consequently, it remains to be decided whether the Statement of Grounds which was filed within four months after the date of the notification of the decision was sufficient to set out grounds of appeal in accordance with Article 108, third sentence, EPC or whether the appeal has to be rejected as inadmissible under Rule 65(1) EPC.

2.4 According to the established case law of the Boards of Appeal (cf. T 145/88, OJ 1991, 251), the grounds of appeal have to specify the legal and factual reasons why the contested decision should be set aside and the appeal allowed.

2.5 In that context, the Board firstly notes that in its Statement of Grounds of Appeal (cf, page 2, thereof) Appellant II has specifically referred to the passage on page 8 of the decision of the Opposition Division, according to which "alleged advantages to which the Proprietor merely refers, without offering sufficient evidence to support the comparison with the closest state of the art, cannot be taken into consideration in determining the problem underlying the invention and therefore in assessing inventive step".

2.6 It is further noted by the Board that Appellant II has filed with its Statement of Grounds a new experimental

report, and that it has submitted that this experimental report provided, in its view, evidence that the compositions according to Claim 1 of the main request, which had been rejected by the Opposition Division in its decision, exhibited better mechanical and structural properties than those of the closest prior art represented by document D15.

2.7 In that respect, it is, however, clear, in the Board's view, that it was the conclusion drawn by the Opposition Division at the bottom of page 8 and referred to by Appellant II in its Statement of Grounds, which has led the Opposition Division to consider that the technical problem underlying the subject-matter of Claim 1 starting from D15 as closest state of the art, "was to provide a composition for the production of biodegradable low-density expanded products capable of resisting to the attack of humidity" (cf. decision under appeal page 9, point 4.5).

2.8 Since it is evident that the conclusion drawn by the Opposition Division at the bottom of page 8 of its decision evidently applied to the alleged but unsubstantiated improvement of mechanical properties (cf. decision under appeal point 4.4 "Effect thus achieved", subparagraph Mechanical properties - Shrinking"), it thus follows that the arguments presented by Appellant II and supported, in its view, by the new experimental report must be considered as an attempt to deprive the decision of the Opposition Division of its fundamental basis for the formulation of the technical problem made by the Opposition Division, and hence to challenge *ab initio* the reasoning of the Opposition Division concerning the

assessment of inventive step of the subject-matter of Claim 1 of the main request.

2.9 Since in the Statement of Grounds of Appeal the Appellant II has further given arguments why the technical effects evidenced in its view by the new experimental report would support the presence of an inventive step in the subject-matter of Claim 1 of the main request, the Board can only come to the conclusion that the Statement of Grounds of Appeal clearly specifies the legal and factual reasons why the contested decision should be set aside and the appeal be allowed, and hence enables the Board and the Opponent to understand immediately why the decision is alleged to be incorrect, and on what facts the Appellant II bases its arguments. Consequently, the appeal of Appellant II must be regarded as admissible.

2.10 This conclusion cannot be altered by the submissions made by Appellant I that the experimental evidence submitted by Appellant II is totally unrelated to the technical effect (resistance to humidity) and to the technical problem to which the contested decision refers, and that thus the Statement of Grounds simply raises a new issue which has nothing to do with the reasons on which the decision was based.

2.10.1 This is primarily because there was no obligation for Appellant II strictly to adhere in its Statement of Grounds to the definition of the technical problem given by the Opposition Division in the decision under appeal.

2.10.2 On the contrary, challenging the formulation of the technical problem made by the Opposition Division in its decision, is, in the Board's view, evidently connected with the reasons given in the contested decision concerning inventive step.

2.10.3 This is even more the case here, since the Opposition Division having justified the formulation of the technical problem underlying the subject-matter of Claim 1 of the main request by the fact that the alleged advantages to which the Patent Proprietor (Appellant II) had referred could not be taken into consideration in its determination because no sufficient evidence had been offered by the Patent Proprietor to support the comparison with the closest state of the art, it can hence be implicitly deduced from the decision under appeal, that the formulation of the technical problem would be susceptible to be challenged provided the missing evidence would be submitted.

2.10.4 It thus follows that Appellant II has not raised a new issue in its Statement of Grounds, but that it has merely tried to fill the missing link objected to in order to improve its position with respect to the issue of inventive step of the subject-matter of Claim 1 of the main request.

2.10.5 Hence, the appeal of Appellant II is admissible

3. *Admissibility of the experimental report submitted by Appellant II with its Statement of Grounds of Appeal into the proceedings and remittal to the first instance.*

3.1 As indicated above in paragraph 2.5, one of the decisive considerations made in the decision of the Opposition Division was that the alleged advantages (i.e. mechanical and structural effects) to which the Patent Proprietor has referred were not supported by sufficient evidence.

3.2 Since this experimental report is presented by Appellant II as a comparison between compositions according to the main request and compositions according to the closest prior art considered in the decision under appeal (i.e. D15), and, hence aims to elucidate the question of the mechanical and structural effects of the claimed invention, it can *prima facie* be seen as highly relevant in view of the considerations made by the Opposition Division in its decision in that respect.

3.3 Consequently, the Board, taking further into consideration that this experimental report has been submitted at the very beginning of the appeal proceedings, sees no reason not to introduce it into the proceedings.

3.4 As indicated above in Section XIII, remittal of the case to the first instance has however been requested by Appellant I in its letter dated 29 May 2006, should this experimental report be admitted into the proceedings.

3.5 In the Board's view, remittal due to the admission of new documents should however be an exception i.e. if, without remittal, a party would not have had sufficient

opportunity to defend itself against an attack based on the new documents.

3.6 As indicated above in paragraph 3.3, the experimental report has however been filed at the very beginning of the appeal procedure. The Board also notes that Appellant I has requested with its letter dated 24 March 2006 an extension of time in order to evaluate this experimental report and that an extension of time (2 months) has been granted by the Board on 24 March 2006 in that respect.

3.7 In this connection, the Board further observes that at the end of this extension of time, no further extension has been requested by Appellant I for that purpose, but, on the contrary, that in its letter dated 29 May 2006 (cf. page 6, line 5 to page 7, line 26) Appellant I has indeed commented in depth the results presented in this experimental report.

3.8 Consequently, the Board can only come to the conclusion that Appellant I has had sufficient time and opportunity to prepare an appropriate defence against the arguments of Appellant II based on this experimental report.

3.9 Furthermore, the new evidence cannot be said to change the factual framework of the case, since it aims to elucidate the question of the mechanical and structural effects of the claimed invention, which had itself formed part of the opposition proceedings (cf. decision under appeal; point 4.4).

3.10 Under these circumstances, there is no reason for the Board to remit the case back to the first instance. Hence, the Board considers it appropriate to make use of its discretionary powers under Article 111(1) EPC and to exercise any power within the competence of the department which was responsible for the decision appealed.

Main request

4. *Wording of the claims*

4.1 Claim 14 of the main request exactly corresponds to Claim 1 of the first auxiliary request on which the Opposition Division has decided that the patent in suit could be maintained.

4.2 While an objection of lack of compliance with Article 123(2) EPC was raised at the oral proceedings of 7 June 2005 by the Opponent against Claim 1 of the first auxiliary request, it has been considered in the decision under appeal this would constitute a fresh ground of opposition, and since, in the Opposition Division's view this fresh ground was late filed and *prima facie* as not sufficiently pertinent, it was not admitted into the opposition proceedings.

4.3 In this connection, the Board however observes that Article 100(c) EPC had been invoked as a ground of opposition by the Opponent in its Notice of Opposition. Hence, objections on the ground of Article 100(c) EPC raised by the Opponent/Appellant in the course of the opposition and appeal proceedings cannot be considered as based on a "fresh ground" of opposition in the sense

of opinion G 10/91 (OJ EPO 1993, 420) and decision G 1/95 (relied on by Appellant II).

4.4 As further held in the decision T 701/97 of 23 August 2001 (not published in OJ EPO), "in the examination of objections under Article 100(c) EPC, the contents of the application as filed and of the granted patent are to be considered as the relevant facts, and all attempts to demonstrate divergences between them are to be considered as arguments based on these facts. In such a case, the "legal and factual framework" as referred to in opinion G 10/91 (reasons 6) is not changed since no new facts or evidence and no new ground need to be relied upon. Where Article 100(c) EPC has been raised as a ground of opposition and has been considered in the appealed decision, it is the board's duty to assess correctly whether or not the respondent's requests comply with said Article. Hence, the board has to consider all arguments which are relevant, **independently of the point in time at which they were introduced into the proceedings.."** (Reasons 1.2)(emphasis by the Board).

4.5 It thus follows from the considerations above that the objection of lack of compliance of Claim 14 of the main request with Article 123(2) EPC does not represent a fresh ground of opposition, and must be hence considered by the Board.

4.6 Taking into consideration that this objection of lack of compliance with Article 123(2) EPC has indeed been reiterated in substance by Appellant I at the very beginning of the appeal procedure (i.e. in its Statement of Grounds of Appeal), and that Appellant II

has hence had ample time and opportunity to consider the substance of the objection, the Board sees no reason to remit the case back to the first instance, as requested by Appellant II, for consideration of this issue.

4.7 Consequently compliance of Claim 14 with Article 123(2) EPC will be checked by the Board.

4.7.1 Claim 14 differs from Claim 14 as originally filed in that (i) the claimed process no longer makes reference to the production of a biodegradable low-density expanded shaped product according to any of the original Claims 10 to 13 and (ii) in that it has been indicated that the claimed process is characterized in that it also comprises the preliminary step of premixing said starch with said at least one lipid before the addition of said at least weak acid or hydrochloric acid.

4.7.2 While amendment (ii) would appear to be supported by the application as originally filed (cf. page 4, lines 56 to 57 of the EP-A1-0 669 369), the question of allowability of Claim 14 under Article 123(2) EPC boils down to the question as to the deletion of the reference to the product of original Claim 10 leads to an unallowable extension of subject-matter.

4.7.3 In that respect, original Claim 10 refers to a biodegradable low density expanded shaped product obtainable by extrusion starting from a starch-based composition according to any of Claims 1 to 7 and having a bulk density comprised between 10 and 40 g/l,

a resiliency of at least 30% and a compressibility comprised between 0.02 and 0.2 kN.

4.7.4 While Claim 14 refers to the extrusion of starch based composition within the ambit of original Claim 1, it is evident that it contains absolutely no indication of the bulk density, the resiliency and the compressibility of the biodegradable low density expanded product obtained by the claimed process.

4.7.5 It is also further evident in the Board's view that the application as originally filed can only provide an explicit support for a process for the production of a biodegradable low-density expanded shaped product having a bulk density comprised between 10 and 40 g/l, a resiliency of at least 30% and a compressibility comprised between 0.02 and 0.2 kN (cf. EP-A1-0 669 369; page 4, lines 46 to 58).

4.7.6 Thus, Claim 14 of the main request could only be considered as allowable under Article 123(2) EPC, provided the claimed process inherently leads inevitably to a biodegradable expanded product having the characteristics set out in paragraph 4.7.5 in terms of bulk density, resiliency and compressibility.

4.7.7 In that respect, as indicated in the decision T 64/03 of 1 February 2005 (not published in OJ EPO; Reasons points 3. and 3.2), it is established Case Law that a very rigorous standard, namely that of "beyond reasonable doubt" is to be applied when checking the allowability of amendments under Article 123(2) and 123(3) EPC.

4.7.8 In this connection, the Board however notes

(a) that further undefined process steps are not excluded by the wording of Claim 14 ("comprising the steps of");

(b) that process conditions such as the temperature or the pressure under which the extrusion should be carried out are not indicated in Claim 14,

(c) that Claim 14 contains no indication on the characteristics of the extruder (e.g. single screw, twin screw, diameter/length ratio) to be used; and

(d) that the amount of blowing agent (e.g. water) is not specified in Claim 14.

4.7.9 Under these circumstances, it could not be excluded in the Board's view, that the process according to Claim 14 could lead to low density expanded products having bulk density, resiliency, or compressibility outside the ranges mentioned above in paragraph 4.7.5.

4.7.10 Since furthermore no evidence has been submitted by Appellant II, which has the onus of the proof, which could dissipate these reasonable doubts, the Board can only come to the conclusion that Claim 14 of the main request does not meet the requirements of Article 123(2) EPC.

4.8 Consequently, the main request must be refused.

First auxiliary request

5. *Admissibility*

5.1 This auxiliary request has been submitted by Appellant II at the oral proceedings before the Board. It differs from the main request in that Claim 14 of the main request has been deleted and in that the remaining claims have been correspondingly renumbered.

5.2 Appellant I has raised objections to the admission of this request since it was very late filed and represented an amendment of Appellant II's case.

5.3 According Article 10(b)(1) RPBA, any amendment to a party's case after it has filed its grounds of appeal may be admitted and considered at the Board's discretion, and this discretion "shall be exercised in view of inter alia the complexity of the new subject matter submitted, the current state of the proceedings and the need for procedural economy".

5.4 In the present case, since, as indicated above in paragraph 5.1 the first auxiliary request differs from the main request only by the deletion of independent Claim 14 thereof, it is hence evident, in the Board's view, that the complexity of subject-matter of this request is not increased in comparison with the subject-matter of the main request.

5.5 Thus, the Board, making use of its discretion under Article 10(b)(1) RPBA decides to admit the first auxiliary request into the proceedings.

6. *Wording of the claims*

6.1 No objection under Article 123(2) EPC or 123(3) EPC has been raised by Appellant I against Claims 1 to 17 of the first auxiliary request.

6.2 The Board is also satisfied that the requirements of these articles are met by all the claims.

7. *Scope of the present appeal proceedings*

7.1 As indicated above in Section III, in its interlocutory decision dated 9 January 2002, the Opposition Division held that the subject-matter of Claim 1 of the auxiliary request, on which it intended to maintain the patent, was novel over documents D1 and D2.

7.2 In its Statement of Grounds of Appeal filed on 18 June 2002, the Appellant (Opponent) contested the findings of the Opposition Division concerning the novelty of the subject-matter of Claim 1 of the allowed request.

7.3 In its decision T 371/02, the Board decided to set aside the decision under appeal, to introduce document D15 into the proceedings and to remit the case to the first instance for further prosecution, but did not take a decision concerning the issue of novelty and inventive step of the subject-matter of the request allowed by the Opposition Division.

7.4 Since Claims 1 to 18 of the main request on which the decision under appeal was based, exactly corresponded to Claims 1 to 18 of the first auxiliary request considered as allowable by the Opposition Division in

its previous interlocutory decision in view of the documents on file at that time, there was no need for the Opposition Division to reconsider the issues of novelty and inventive in that respect, so that the Opposition Division was right, in the Board's view, to carry out the further assessment of novelty and inventive step only in the light of document D15.

7.5 In its Statement of Grounds of Appeal, Appellant II has requested, as main request, that the patent be maintained on the basis of Claims 1 to 18 submitted as main request at the oral proceedings of 7 June 2006 (i.e. corresponding to Claims 1 to 18 of the first auxiliary request considered as allowable by the Opposition Division in its previous interlocutory decision).

7.6 In its response to the Statement of Grounds of Appellant II, Appellant I has contested the novelty of the subject-matter of Claim 1 of the main request in view of D1 and D2 and has referred to the arguments submitted in that respect in its letter dated 18 June 2002. It had further objected that the subject-matter of Claim 10 was not novel over D7.

7.7 In that context the Board observes that there is no reason to assume that the Board in its decision T 371/02 has dealt, even implicitly, with the assessment of novelty of the subject-matter of Claim 1 then on file, which as indicated above corresponds to Claim 1 of the present first auxiliary request, over D1 and D2.

7.8 It thus follows that the novelty of the subject-matter of Claim 1 of the first auxiliary request over D1 and D2 is not *res judicata*. Consequently, since the objection of lack of novelty of the subject-matter of Claim 1 has been maintained by Appellant I in the present appeal, the assessment of the novelty of the subject-matter of Claim 1 of the first auxiliary request over D1 and D2 is part of the present appeal proceedings.

7.9 Concerning the objection of lack of novelty of the subject-matter of Claim 10 over D7, the Board notes that in the Notice of Opposition (cf. page 8) document D7 has been cited by Appellant I in order to challenge the inventive step of the subject-matter of granted Claim 10, which corresponds to Claim 10 of the first auxiliary request.

7.10 Since a finding of lack of novelty over D7 would inevitably result in a lack of inventive step (cf. also decision G 1/95, Reasons point 7.2), and since the question of inventive step of the subject-matter of Claim 10 has not been dealt with in the decision T 371/02, the Board sees no reason not to consider in the present appeal the objection of lack of novelty raised by Appellant I against Claim 10 over document D7.

8. *Novelty*

8.1 Lack of novelty of the subject-matter of the first auxiliary request has been alleged by Appellant I only in respect of Claim 1 in view of documents D1 and D2, and in respect of Claim 10 in view of document D7.

8.2 Document D1 relates to a method for producing destructurized starch, comprising heating a chemically non-modified starch material having a water content in the range of about 10 to 25 % by weight of the total weight of the composition, in the presence of a chain scission catalyst in a closed volume to an elevated temperature sufficient to form a thermoplastic melt and continuing heating until the mass average molar mass of said starch material is reduced by a factor of 2 to 5000, compared with its original mass average molar mass (claim 1).

8.3 According to D1, the chain scission catalyst which is preferably an acid or a base, including Lewis acids (Claim 6), may be selected from hydrochloric acid, sulfuric acid, EDTA, citric acids or a mixture of these compounds (Claim 9), and is added in a concentration in the range of 10^{-6} to 10^{-2} mole of catalyst per mole of anhydro-glucose unit (AGU) (Claim 10).

8.4 According to D1, animals or vegetable fats such as triglycerides with C_{12}, C_{14}, C_{16} and C_{18} fatty acids may be used as lubricants, optionally together with a mono and/or diglyceride and/or a phosphatide in a total amount of up to 5%, preferably within the range of 0.5 to 2% by weight of the total composition (page 4, lines 51 to 60).

8.5 In its Example 1, D1 discloses a starch composition to be used in this process and consisting of 82,3 parts of natural potato starch, 0,83 parts of the hydrogenated triglyceride containing the fatty acids C_{18},C_{16}, and C_{14} in a ratio of 65:31:4 weight percent, 0,415 parts lecithin, 0,415 parts titanium dioxide, 17 parts water

and HCl (1 molar) in a proportion of $0,8 \times 10^{-3}$ mole per mole of AGU.

8.6 In this connection, the Board notes that Claim 1 of the main request requires, explicitly, that, in the claimed composition,

(a) the starch be present in an amount comprised between 96% and 99% in weight,

(b) said starch has an amount of amylose comprised between 18% and 43% in weight on the total weight thereof;

(c) at least a weak acid or hydrochloric acid be present in an amount comprised between 0.2% and 2% in weight; and

(d) at least a lipid selected from the group consisting of peanut oil, maize oil, palm oil, and mixtures thereof be present in an amount comprised between 0.5% and 2% in weight.

8.7 According to the decision T 355/99 of 30 July 2002 (not published in OJ EPO), it is not sufficient for a finding of lack of novelty that the claimed features could have been derived from a prior art document, there must have been a clear and unmistakable teaching of the claimed features (Reasons, point 2.2.4).

8.8 Thus, the question boils down whether there is in D1 a clear and unmistakable teaching of the combination of features mentioned above in paragraph 8.6 taking into

account that the enabling disclosure of a document is not restricted to its worked examples.

8.9 In that respect, it is primarily evident that D1 defines neither the amylose content of the starch to be used nor the amount of starch to be used in the composition to be treated by the destructurization process. Furthermore, independently of the fact that the chain scission catalyst might be selected from strong acids such as sulfuric acid, and of the question as whether the amount of the chain scission catalyst calculated in mole/AGU in the range of 10^{-6} to 10^{-2} might correspond to the amount of weak acid or HCl indicated in Claim 1, it is further evident that D1 does not disclose the use of a lipid selected from peanut oil, maize oil, palm oil and mixture thereof in the composition in the composition for the destructurization process let alone in combination with a weak acid or HCl in the amounts required by Claim 1 of the fist auxiliary request.

8.9.1 This is because, although D1 mentions very broadly that triglycerides with C_{12}, C_{14}, C_{16} and C_{18} fatty acids may be used as a lubricant, this cannot be considered as disclosing unmistakably a lipid component based on the specific mixture of fatty acids present in peanut oil, maize oil, palm oil and mixtures thereof, i.e. exhibiting the concomitant presence of several C_{18} fatty acids (stearic, oleic and linoleic acid) or the presence of C_{20} and C_{22} fatty acid (peanut oil) (cf. document D4, Table 3).

8.9.2 Nor could Example 1 of D1 be considered as disclosing such combination at least for the reason that the fat

used in that example is an hydrogenated triglyceride and hence not a lipid as required by Claim 1.

8.10 Consequently, the subject-matter of Claim 1 must be considered as novel over D1.

8.11 Document D2 relates to expanded low bulk density solid products, and to expandable compositions for preparing the solid foam products (page 1, lines 6 to 7). According to D2, the expandable composition comprises (a) a normally solid water-insoluble natural polysaccharide such as a starchy substance, having an amylose content of up to 35% by weight, (b) a minor amount of water-swellable environmentally-acceptable polysaccharidic gum, and (c) water in a minor amount from about 10 to 25 percent by weight based on component (a) sufficient to form an extrudable substantially homogeneous thermally gelatinizable and meltable material polysaccharide composition (Claims 12 and 13). The expandable composition might by mixed with a minor proportion of C_1 to C_6 carboxylic acid (Claim 18). It can also be mixed with a minor portion of a lipid (Claim 19). According to D2, the amount of acid is generally between 0.1 and 4% by weight based on component (a) and the amount of lipid is generally between 0.1 and 3% by weight based on component (a). The lipids are typically C_{12} to C_{18} fatty acids, their mono-, di and tri- esters of glycerol or other polyol or polyhydroxycarbohydrate, such as, for example, sorbitol and sorbitol ethylene oxide condensation products (page 11, lines 9 to 16).

8.12 Only one example of D2 (Example 5) discloses the concomitant use of a weak acid (citric acid in an

amount of 1% by weight) and a lipid (monooleyl glyceride in an amount of 0.25% by weight) in the expandable composition.

8.13 In that context, it is evident, for the same reasons given in respect of document D1, that the broad reference to the use of lipids based on C_{12} to C_{18} fatty acids in the expandable composition made in D2 cannot amount to a unmistakable disclosure of the specific lipid composition according to Claim 1.

8.14 Furthermore, in the only part of D2 where the combined use of an acid and a lipid is disclosed (i.e. Example 5), not only does the lipid used not fall under the definition of the lipid component according to Claim 1, but furthermore its amount is clearly outside the range required by Claim 1 for this component, being too low (0.25% by weight compared with a minimum of 0.5% by weight required by Claim 1).

8.15 Consequently, at least for these reasons D2 cannot destroy the novelty of the subject-matter of Claim 1.

8.16 It thus follows that the subject-matter of Claim 1 must be regarded as novel over the prior art relied on by Appellant I (Article 54(1)(2) EPC).

8.17 Concerning the subject-matter of Claim 10, the Board observes that this claim is directed to a biodegradable low density expanded shaped product having in particular a specific combination of properties in terms of bulk density (between 10 and 40g/l), resiliency (at least 30%), and compressibility (between 0.02 and 0.2kN).

8.18 Document D7 is directed to a method for producing a foamed packing material of biodegradable composition, comprising the steps of: a) selecting a dry, powdered, starch material having no greater than 30% (w) water content; b) admixing to the starch material a mild acid in dry, powdered form selected from the group consisting of malic acid, tartaric acid, citric acid, maleic acid and succinic acid, said acid being at a composition percentage of 0.2 to 7% (w) of the total starch composition; c) admixing to the starch material a dry, powdered carbonate composition capable of reacting with acid to generate CO_2 gas, said carbonate composition being at a composition percentage of 0.1 to 2% (w) of the total starch composition; d) introducing the admixed dry materials of steps a), b) and c) within an initial stage of a screw impeller within an extrusion means; e) adding sufficient water to the dry materials of step d) at the initial stage of the impeller to convert the dry materials to a gelatinous state when subjected to elevated temperatures and pressures within the extrusion means; f) mixing and advancing the product of step e) within an extrusion barrel of the extrusion means to generate elevated heat and pressure for converting the material to the gelatinous state; g) concurrently reacting the acid within the extrusion barrel (i) with the starch material for decreasing molecular weight of the starch material while disrupting the uniformity of hydrogen bonding within and between starch chains, and (ii) with the carbonate material to produce CO_2 for expanding the starch at reduced molecular weight and increased structural randomness of the starch chains; and h) discharging the product of step g) through a die

opening to generate expansion of the CO_2 to form a closed cellular structure having a density less than 0.032 grams per cubic centimeter and with resilient properties which enable substantial return of the compressed structure to its original, expanded shape with structural integrity (Claim 1).

8.19 While D7 discloses the manufacture of a foamed packaging material having a density of approximately 0.020 to 0.025 grams per cubic centimeter, a compressibility of approximately 50 to 1000 grams per square centimeter and a resiliency from 60 to 85% (column 6, lines 60 to 64), it is however evident that the density reported for this packaging material does not correspond to the bulk density set out in Claim 10 and that no comparison can be made between the compressibility expressed in gram per square centimeter (i.e. in terms of a pressure) in D7 and the compressibility expressed in kN (i.e. in terms of a force applied) in Claim 10.

8.20 Thus at least for these reasons D7 cannot be considered as a novelty destroying document for the subject-matter of Claim 10.

8.21 The Board comes hence to the conclusion that it has not been shown to its satisfaction that there is a deficiency in the first auxiliary request contrary to Article 54 EPC. Consequently the subject-matter of the claims of the first auxiliary request must be regarded as novel.

9. *Problem and solution*

9.1 The patent in suit relates to starch based composition for making biodegradable low density product.

9.2 Such compositions are known from document D15, which the Board regards as the closest state of the art.

9.3 Document D15 refers to the extrusion of low density expanded products from compositions comprising a starchy component and an acid (cf. Claims 1, 4, 5, 11) and teaches that oils or fats might be incorporated in the composition to improve their water resistance (cf. column 3, lines 19 to 35; Claim 9). In its Example 1 D15 discloses a composition comprising 95.4% by weight of ground wheat having a water content of 12%, citric acid in an amount of 0.3% by weight, 4% by weight of water, and 0.3% by weight of sodium bicarbonate, which is extruded to form a packing material having a specific weight between 15 and 29 g/l, which exhibit good elastic and damping properties.

9.4 According to the patent in suit its aim is to provide a starch composition which allows the manufacture of biodegradable low density product having good structure and mechanical properties, but also capable of keeping these properties and its shape in the long run due to resistance to hydrolytic attack of humidity (cf. paragraph [0080]).

9.5 Since D15 is, as shown above also concerned with the mechanical and structural properties and with hydrolysis resistance of the low density expanded articles produced from the compositions disclosed

therein, starting from D15, the technical problem may hence primarily be seen in the provision of an expandable starch composition leading to biodegradable low density expanded articles having improved mechanical and structural properties and capable of keeping them in the long run due to resistance against hydrolytic attack of humidity.

9.6 In order to establish whether the stated problem has been credibly solved, it is necessary to compare the results achieved according to the patent in suit with those according to the closest state of the art (T 248/85, OJ EPO 1986, 261). Furthermore, according to the established case law of the Boards of Appeal, advantages not supported by sufficient evidence cannot be taken into consideration in determining the underlying problem and hence in assessing inventive step (T 20/81 OJ EPO 1982, 217).

9.7 In the present case, Appellant II has submitted with its Statement of Grounds of Appeal an experimental report in order to compare, in its view, the composition according to the patent in suit and composition according to Example 1 of D15.

9.8 Thus, the question boils down as to whether the alleged improvements are effectively supported by the evidence submitted.

9.8.1 In that respect, it has been clarified at the oral proceedings when discussing in detail the said experimental report that water must be added to the compositions Obtusa 1 M 100, Obtusa 1 M 300, Confronto M 100 and Confronto M 300 disclosed in this

experimental report in order to obtain a processable and expandable product.

9.8.2 Since the amount of water added in the tested compositions is not indicated in the experimental report, this inevitably blurs the actual amounts of starch, citric acid and palm oil used in the compositions referred to in the experimental report.

9.8.3 There is hence no evidence whether the composition Obtusa 1 M 100 presented as according to the invention indeed falls under the scope of Claim 1 and whether the compositions Obtusa 1 M 300, Confronto M 100 and Confronto M 300 could be considered as representative of the composition according to Example 1 of D15, so that the comparisons made in the experimental report are, in the Board's view, not appropriate for demonstrating that the claimed compositions exhibit improved mechanical and structural properties over the composition of the closest prior art (Example 1 of D15). This further implies that no direct comparison with D15 of the performance of the compositions according to the patent in suit in terms of mechanical or structural properties is possible.

9.9 It is therefore necessary to re-formulate the problem in less ambitious terms, namely, to provide starch based compositions for the production of biodegradable low density shaped articles having resistance to the attack of humidity.

9.10 As indicated above D15 teaches to add oils or fats in order to increase the water resistance of the expanded articles made from the compositions disclosed therein.

9.11 While it is true that D15 does not disclose the specific lipid component according to Claim 1 and that it does not specify in which amounts oil or fats should be added, no evidence had been provided by Appellant II that the choice of lipid and amount thereof are critical to the obtaining of resistance against the attack of humidity. The same applies for the amylose content of the starch as defined in Claim 1.

9.11.1 Taking further into account that the oils defined in Claim 1 are quite common and that the starches used are common starches (cf. Claim 2), the choice of these oils and starch is in the Board's view, devoid of practical effort, or of "purposive selection", in the absence of anything to the contrary (cf. also T 513/90, OJ EPO, 994, 154).

9.11.2 Consequently, the subject-matter of Claim 1 of the first auxiliary request must be considered as obvious in view of D15.

9.11.3 It thus follows that the first auxiliary request must be refused.

Fifth (bis) auxiliary request

10. *Wording of the Claims*

10.1 No objection under Article 123(2) and 123(3) EPC has been raised against Claims 1 to 7 of this request by Appellant I. The Board is also satisfied that the requirements of these Articles are satisfied.

10.2 Nevertheless it has been submitted by Appellant I that the filing of dependent Claims 2 to 7 was not justified by a ground of opposition, and that therefore the fifth (bis) auxiliary request contravenes Rule 57(a) EPC.

10.3 In that respect, the Board observes that granted process Claims 15 and 16 referred explicitly to the shaped articles according to granted Claim 10, which itself referred back to the compositions according to granted Claims 1 to 7. In other words the characteristics of granted Claims 1 to 7 were implicitly present in Claims 15 and 16.

10.4 Since, in the Board's view, dependent Claims 2 to 7 now merely expressly disclose features which were inherently present in the granted Claims 15 and 16, the filing of dependent Claims 2 to 7 cannot be considered to be in breach with Rule 57(a) EPC (cf. also T 332/04 of 31 August 2006; not published in OJ EPO).

11. *Novelty*

11.1 No objection of lack of novelty has been raised by the Appellant I against the subject-matter of Claims 1 to 7.

Nor does the Board have any reason to take a different view.

11.2 The requirements of Article 54 EPC are therefore considered as met.

12. *Problem and solution*

12.1 Claim 1 of the fifth (bis) auxiliary request is directed to an extrusion process for making biodegradable low density expanded starch based products.

12.2 Such processes are disclosed in documents D15 and D2.

12.3 In that respect D15 discloses that the extrusion of a starch composition, in which starch may be mixed with the other components such as oils, fats, catalysts (e.g. citric acid) of the starchy composition either before the extrusion step or directly in the extruder (cf. D15, column 4, lines 28 to 41; Figure 1). D15 does not however disclose that the oil or the fats be mixed with the starch before the addition of the catalyst (e.g. citric acid).

12.4 According to D2, the process comprises the steps to prepare an expandable starch composition (cf. also paragraph 8.11 above), of heating and mixing the expandable composition in an extrusion zone at a temperature and pressure and for a time effective to form a substantially molten extrudable composition, extruding the composition through a shaped die into a lower temperature and pressure zone so as to form a shaped form, the pressure being sufficiently low relative to that in the extrusion zone to allow the foam to expand to a bulk density of about 0.7 to 1.2 lbs/cu ft, the temperature being sufficiently low to allow the foam to cool and harden, allowing the foam to harden to a resilient low-bulk density product free

of synthetic polymer, and recovering the product (claim 12).

12.5 While, as indicated above, D2 mentions that a minor proportion of a C_1 to C_6 carboxylic acid and that a minor proportion of a lipid might be mixed with the expandable composition (claims 18 and 19), it does not disclose that the lipid must be premixed with the starch before the addition of the acid.

12.6 Independently of the fact that neither D2 nor D15 discloses the manufacture of an expanded shaped product having the combination of compressibility, bulk density and resiliency set out in Claim 1, the essential distinguishing feature between the extrusion process according to Claim 1 and the process disclosed in either D15 or D2 is the fact that the lipid must be premixed with the starch before the addition of the acid component.

12.7 In view of paragraphs [0048],[0049] and [0054] of the patent in suit, starting from either D2 or D15, the technical problem underlying the claimed process according to Claim 1 may hence be seen in the provision of an extrusion process for making low density expanded product from starch compositions which avoid excessive dextrinization (overcooking) of the starch during extrusion which might result in friability of the expanded product.

12.8 In that respect, the Board notes that it had not been contested by Appellant I that the premixing of the lipid with the starch before addition of the acid

component provides an effective solution to this technical problem.

12.9 Consequently, it remains to be decided whether the proposed solution was obvious in view of the prior art relied on by the Appellant (i.e. D2, D10, and D15).

12.10 In this connection it is evident that document D15 is not concerned with the problem of excessive dextrinization. Consequently, it cannot provide a hint to the solution proposed in the patent in suit.

12.11 While D2 is concerned with the problem of friability of expanded starch products made by extrusion of starch expandable compositions (cf. page 1, lines 6 to 12), the solution proposed by D2 is to use a gum in the starch composition in order to reduce the friability of the extruded articles (page 8, last paragraph).

12.12 In the Board's view, even if it would be considered that the problem of friability of the expanded starch might have been known to be linked with an excessive dextrinization of the starch during the extrusion, there is absolutely no indication in D2 that premixing of a lipid with the starch would avoid excessive dextrinization when an acid is also added into the expandable composition, since the lipid in D2 is merely used as a surfactant (page 11, lines 12 to 14).

12.13 Consequently, the argument of Appellant I in view of Example 5 of D2 which discloses the concomitant use of a lipid with an acid (citric acid) in the expandable composition, according to which the fact that the citric acid, being added in solid form, would only

become active after addition of water, would implicitly suggest to add the acid after the lipid had been premixed with the starch to reduce excessive dextrinization, can only be considered as based on an ex post facto analysis of document D2, using knowledge of the invention as assistance (cf. patent in suit paragraph [0054]).

12.14 Nor could a combination of D2 with D10 as done by Appellant I in its Statement of Grounds of Appeal provide a hint to the solution proposed by the patent in suit.

12.15 This is because there is absolutely no indication in D10 that lipids might reduce the risk of excessive dextrinization during the extrusion of starch compositions also comprising an acid component, since according to D10 (cf. page 9, lines 29 to 39) the vegetable or animal fats are merely used to improve the flow properties of the starch material.

12.16 Consequently the subject-matter of Claim 1 must be regarded as involving an inventive step over the prior art relied on by Appellant I. The same conclusion applies for dependent Claims 2 to 7.

12.17 It thus follows that the fifth (bis) auxiliary request is allowable.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance, with the order to maintain the patent on the basis of the fifth (bis) auxiliary request, filed with letter dated 5 March 2007, and after any necessary consequential amendment of the description.

The Registrar: The Chairman:

E. Görgmaier R.Young