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D E C I S I O N
of 2 July 1998

Case Number: T 0400/94 - 3.3.3

Application Number: 89103504.0

Publication Number: 0332027

IPC: C08B 30/12

Language of the proceedings: EN

Title of invention:
Modified starch emulsifier characterized by shelf stability

Applicant:
National Starch and Chemical Corporation

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 52(1), 84, 123(2)

Keyword:
"Added subject-matter - main request (yes) - auxiliary request (no)"
"Auxiliary request - clarity (yes) - novelty (yes)"
"Inventive step - referral back at request of Appellant"

Decisions cited:
T 0219/83, T 0454/89

Catchword:



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Boards of Appeal

Chambres de recours

Case Number: T 0400/94 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 2 July 1998

Appellant:

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Decision under appeal:

Decision of the Examining Division of the
European Patent Office posted 2 December 1993
refusing European patent application
No. 89 103 504.0 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: C. Gérardin
Members: R. Young
A. C. G. Lindqvist

Summary of Facts and Submissions

- I. European patent application No. 89 103 504.0, entitled "Modified starch emulsifier characterized by shelf stability", filed on 28 February 1989 and published under No. 0 332 027 was refused by a decision of the Examining Division dated 2 December 1993. The decision was based on Claim 1 forming the basis of a main request, and Claim 1 of a set of Claims 1 to 8 forming an auxiliary request, both filed during oral proceedings held on 19 January 1993. Claim 1 of the main request (Annex I of the decision under appeal) read as follows:

"A modified starch having emulsification properties consisting of a starch derivative with an introduced substituent radical containing a hydrophobic group being an alkyl, alkenyl, aralkyl or aralkenyl group containing at least 5 carbon atoms, wherein the starch derivative being degraded by an enzyme, characterized in that the starch derivative has been degraded by up to 70%, by weight of the starch, by an exo-enzyme capable of cleaving 1,4-alpha-D-glucosidic linkages from non-reducing ends of the starch but incapable of cleaving 1,6-alpha-D-glucosidic linkages of the starch."

Claim 1 of the auxiliary request (Annex II of the decision under appeal), from which the wording "new claims for ES" should be understood as having been deleted (letter filed on 11 November 1993), read as follows:

"A method for preparing a modified starch having emulsification properties, comprising the steps of:

a) providing a starch derivative, the derivative being characterized by each substituent radical containing a hydrophobic group or both a hydrophilic group and a hydrophobic group wherein the hydrophobic group being an alkyl, alkenyl, aralkyl or aralkenyl group containing at least five carbon atoms; and

b) degrading up to 70%, by weight, of the starch derivative to maltose with an exo-enzyme capable of cleaving the 1,4-alpha-D-glucosidic linkages from non-reducing ends of starch but incapable of cleaving 1,6-alpha-D-glucosidic linkages of starch."

II. According to the decision, the requirements of Articles 123(2), 84 and 52(1) EPC were infringed in Claim 1 of both requests. As regards Article 123(2) EPC, the deletion of the feature "being characterized by improved stability and resistance to gelling during storage" from the original Claim 1, which was a limiting and characterizing feature, broadened the scope of the claim unallowably. As regards Article 84, the term "having emulsification properties" was obscure, since no method was specified in the claim for its measurement. Finally, with regard to Article 52(1), the lack of any lower limit for the enzymatic degradation and the absence of any clear definition of the starting materials meant that it was not possible to ascertain whether or what degradation had taken place, and consequently it was not possible to distinguish the resultant products from those of D3: US-A-4 035 235. Hence, there was a lack of novelty.

III. On 8 February 1994, a Notice of Appeal against the above decision was filed, together with payment of the prescribed fee.

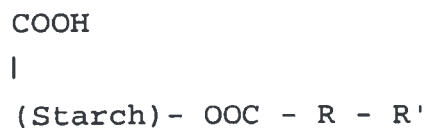
The Appellant submitted, on 12 April 1994, together with the Statement of Grounds of Appeal, two amended sets of Claims 1 to 7 forming a main and an auxiliary request respectively as well as a proposal for a further amendment forming a second auxiliary request, and argued that the objections in the decision under appeal had been met. In particular, the new sets of claims were both directed to a method, in which a lower limit of degradation of 13% by weight had been introduced, and further evidence would be filed showing that such "low modified starches" provided improved emulsion stability.

IV. Following the issue, on 19 September 1997, of a communication by the Board, in which objection was raised *inter alia* that the lower limit of 13% comprised added subject-matter (Article 123(2) EPC), and inviting the Appellant to file the promised further evidence, the Appellant filed, on 21 January 1998, a single set of Claims 1 to 6 forming a sole request, and also further experimental data showing the effect on retrogradation of varying degrees of degradation resulting in low-modified starch samples. The lower limit of 13% degradation, which had been retained in Claim 1 of the new set of claims, was argued to be supported by the reference, on page 15 of the application as filed, to the latter percentage in connection with the prior art document US-A-3 525 672, since this had clearly been intended to form part of the relevant teaching.

V. Oral proceedings took place on 2 July 1998 before the Board. At the oral proceedings, the Appellant replaced the previous claims by two further sets of Claims 1 to 6, labelled "main request" and "2. request", forming a main and an auxiliary request respectively.

Claim 1 of this main request reads as follows:

"A method for preparing a modified starch having emulsification properties, characterised by degrading a starch derivative until from 13% up to 70%, by weight, of the starch derivative have been degraded to maltose with an exo-enzyme capable of cleaving the 1,4-alpha-D-glucosidic linkages from non-reducing ends of the starch but incapable of cleaving 1,6-alpha-D-glucosidic linkages of the starch, that starch derivative containing a hydrophobic group being an alkyl, alkenyl, aralkyl or aralkenyl group containing at least five carbon atoms or both a hydrophobic group and a hydrophilic group in a substituent radical having the formula



wherein R is a radical from the class of dimethylene and trimethylene radicals and R' is the hydrophobic group which comprises an alkyl or alkenyl group containing at least five carbon atoms or an aralkyl or aralkenyl group containing at least seven carbon atoms and the carboxyl radical COOH is the hydrophilic group."

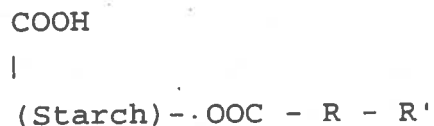
Claim 4, an independent claim, reads as follows:

"A method for preparing a modified starch having emulsification properties characterised by:

a) degrading the starch until from 13% up to 70%, by weight, of the starch have been degraded to maltose with an exo-enzyme capable of cleaving the 1,4-alpha-D-glucosidic linkages from non-reducing ends of the

starch but incapable of cleaving 1,6-alpha-D-glucosidic linkages of the starch; and

b) reacting the enzymatically degraded starch with a reagent to provide a starch derivative, the starch derivative containing a hydrophobic group being an alkyl, alkenyl, aralkyl or aralkenyl group containing at least five carbon atoms or both a hydrophobic group and a hydrophilic group in a substituent radical having the formula



wherein R is a radical from the class of dimethylene and trimethylene radicals and R' is the hydrophobic group which comprises an alkyl or alkenyl group containing at least five carbon atoms or an aralkyl or aralkenyl group containing at least seven carbon atoms, and the carboxyl radical COOH is the hydrophilic group."

Claims 2, 3 and 5, 6 are dependent claims directed to elaborations of the method according to Claim 1 and Claim 4, respectively. In Claims 2 and 5, in particular, the starch is further defined in terms of its "waterfluidity".

With regard to the retention of the lower limit of "13%" degradation in the main request, the Appellant furthermore argued substantially as follows:

- (a) The reference to US-A-3 525 672 in the crucial sentence was not an acknowledgment of prior art, since the latter document had already been fully acknowledged on page 5 of the application.

- (b) This sentence was in any case "sandwiched" between two other sentences, both clearly referring to the claimed subject-matter. Consequently, it was illogical to construe the intervening sentence as referring to the prior art.
- (c) The description stated that the modified starches "of the invention" could be used inter alia in ice cream. Ice cream was, however, a thickened foodstuff analogous to the "puddings or other thickened foods", explicitly referred to in the acknowledgment of US-A-3 525 672 on page 5. Consequently, it was evident that the sentence which referred to the degree of degradation relevant to such high viscosity applications should be understood in relation to the claimed method.

Hence, there had been no addition of subject-matter.

Claims 1 to 6 of the auxiliary request are identical with those of the main request, except that the limit of "13%" has been replaced by "55%" in Claims 1 and 4 respectively.

- VI. The Appellant requested that the decision under appeal be set aside, and that the case be remitted to the first instance for further prosecution on the basis of the main request or the auxiliary request, both submitted during the oral proceedings.

Reasons for the Decision

1. The appeal is admissible.
2. *Admissibility of amendments (Article 123(2) EPC)*
 - 2.1 Main request (Claims 1 to 6 labelled "main request")

The lower limit of "13%" degradation, inserted in Claim 1 has no counterpart in the documents of the application as filed, except in the description on page 15, final paragraph, which was relied upon by the Appellant. This paragraph reads as follows, with the relevant sentence reproduced in bold type.

"The degree of starch degradation that is required to substantially improve the low temperature stability of the starch composition is subject to variation. It depends on the type of starch utilized, the presence and nature of any substituent groups and the degree, if any, of conversion. **Starch degradation ranging from 13-55%, by weight, is known to yield improved low temperature stability in thickeners. (See U.S. Pat. No. 3,525,672)** For low viscosity emulsification applications (i.e. starches converted to a WF of 40-60), degradation progresses until up to 70%, by weight, of the starch, as measured by reducing sugar content of the starch dispersion, has been hydrolyzed to maltose."

- 2.1.1 It must be borne in mind that the purpose of the method according to Claim 1 is to provide a modified starch emulsifier having shelf stability

(title). Whilst it is true that the first two sentences (i.e. those preceding the one in bold type) relate to the degradation step in the production of such a material, and to this extent to the claimed subject-matter, the content of these sentences is, in the Board's view, essentially speculative, since they fail to give any concrete information as to what level of degradation might be appropriate for providing an effective degree of stabilisation. On the contrary, the skilled reader is merely informed that the appropriate level may vary.

- 2.1.2 Furthermore, the relevant third sentence of the paragraph (bold type) is exclusively concerned with what has been found effective in another context, specifically that of the starch thickeners according to US-A-3 525 672.
- 2.1.2.1 In this connection, closer examination of the acknowledgment of the latter document, elsewhere on page 5 of the description as filed, shows that these processes are stated not to provide stable emulsifying starches (page 5, lines 4 and 5). Indeed, experimental evidence was filed during the examination proceedings, in the form of an affidavit, to establish that the starch thickeners disclosed in this document are devoid of any emulsification properties (submission dated 30 November 1991, received on 3 December 1991).
- 2.1.2.2 Consequently, the third sentence does not add any relevant information to the first, at least as far as the claimed subject-matter is concerned.
- 2.1.3 Only the final sentence, which refers to "low viscosity" emulsification applications, refers

unambiguously to species as defined in Claim 1 of the application in suit. The phrase "degradation progresses until up to 70%, by weight, of starch... has been hydrolyzed to maltose" does not, however, mention a particular lower level of degradation. On the contrary, the implication is rather that a level of degradation in the region of 70%, by weight, is appropriate.

2.1.4 Consequently, the skilled reader would conclude that the only relevant limit for the degradation of emulsifying starch derivatives according to the application in suit was the upper limit given in the final sentence.

2.1.5 The argument of the Appellant at oral proceedings concerning the similarity between "ice cream", referred to in the application in suit, and thickened products according to US-A-3 525 672 (Section IV.(c), above), is not convincing, because there is no indication that the modified starch emulsifier has a thickening function in ice cream. On the contrary, ice cream only becomes "stiff" when it is frozen. At higher temperatures of around 7°C, referred to in the examples, ice cream has flow properties similar to those of a beverage. Consequently, there is nothing to support the thesis that the lower limit referred to in connection with thickeners (third sentence) would be applicable to the low viscosity emulsifying starch derivatives (final sentence).

2.1.6 In summary, the interpretation of the relevant passage canvassed by the Appellant is, at best, doubtful. Whilst there may be some issues in which a matter of doubt may properly be resolved in favour of the applicant or patentee (T 0219/83,

OJ EPO 1986, 211), there is, in the Board's view, no justification for giving the party requesting, or responsible for, an amendment such benefit of the doubt in a question of added subject-matter.

2.1.7 Hence, it is held that there is no support, in the documents of the application as filed, for the reference to a lower limit of "13%" degradation in Claim 1 of the application in suit. The amendment thus comprises added subject-matter in contravention of Article 123(2) EPC, and the main request must for this reason be rejected.

2.2 *Auxiliary request* (Claims 1 to 6 labelled "2. request")

As stated above, these claims differ from the main request only in that the lower limit of "13%" degradation has been replaced by "55%" in Claims 1 and 4 respectively.

2.2.1 The lower limit of "55%" degradation in Claim 1 is supported by the description on page 7, line 11 of the description as filed (page 4, line 2 of the printed application), which refers specifically to a level of up to 70% (preferably 55%), by weight of the starch derivative being degraded to maltose.

2.2.2 The lower limit of "55%" degradation in Claim 4 supported by the description on page 8, lines 14 to 18 of the description as filed (page 4, lines 24 to 26 of the printed application), which refers specifically to a level of up to 70% (preferably 55%), by weight of the starch being degraded to maltose.

- 2.2.3 The objection, in the decision under appeal, that Claim 1 had been broadened by deletion of the feature "being characterized by improved stability and resistance to gelling during storage" is no longer applicable, following the substantive restriction of the relevant lower limit of degradation to 55%, since the product no longer corresponds to a "low modified starch".
- 2.2.4 Similar considerations apply to the corresponding wording of Claim 4.
- 2.2.5 Consequently, the specific objections raised under Article 123(2) EPC have been met in the amended claims of the auxiliary request.

3. *Clarity*

- 3.1 The general reference, in Claims 1 and 4, to a modified starch "having emulsification properties" defines the general field of utility of the claimed subject-matter. The solution of the technical problem as defined in the characterising portion of the claim is not concerned with the extent of such emulsification properties - which in any case depend on the particular extrinsic environment of application - but rather with their retention in emulsions under freeze/thaw cycling and conditions of low temperature storage and transport. Consequently, the criticism in the decision under appeal, that no method had been disclosed for measuring the emulsification properties themselves is irrelevant to an understanding of the claim.

- 3.2 The objection in the decision under appeal to the term "hydrophilic" (page 8, penultimate paragraph) has been overcome by the specific definition, in Claims 1 and 4, of the group as being "COOH".
- 3.3 Finally, the parameter "waterfluidity" in Claims 2 and 5 has, in the Board's view, been adequately defined in the description (page 11, lines 5 to 21 of the description as filed, corresponding to page 5, lines 16 to 26 of the printed application). A reference to the relevant parameter in the claims or elsewhere will not, therefore, give rise to lack of clarity for the skilled reader, who is assumed to read the entire document.
- 3.3.1 The objection in the decision under appeal to interpreting the claim in the light of the description relied upon the decision T 0454/89 of 11 March 1991 (not published in OJ EPO). This decision dealt with a very different situation, however, in which two characterising features predicated mutually exclusive restrictions on a third feature. There was hence a contradiction which could not be resolved by common sense (Reasons for the decision, point 4.1, especially sub-paragraph (v)). In the present case, however, the meaning of the claim is, on the contrary, perfectly clear. In particular, there is no contradiction implied by the term "waterfluidity".
- 3.3.2 Consequently, there is no barrier to consulting the description.

4. *Novelty*

4.1 According to D3, a method for producing a lipophilic derivative of starch to be used in encapsulating water-insoluble substances, such as flavouring oils, comprises treating the washed, granular reaction product of waxy maize starch and a substituted cyclic dicarboxylic anhydride, with an alpha-amylase enzyme which gelatinises and depolymerises the starch (Claim 1). There is, however, no disclosure in D3 of degradation with an exo-enzyme as defined in Claim 1 or Claim 4 of the application in suit, let alone to an extent such that 55 to 70%, by weight of the starch have been degraded to maltose. Consequently, the claimed subject-matter is novel over D3.

4.2 Nor can the Board see any reason to doubt the novelty of the claimed subject-matter over the disclosures of either of the remaining documents mentioned in the decision under appeal.

4.3 In other words, the claimed subject-matter is novel.

5. *Inventive step, etc.*

It is evident from the view, expressed in the communications of the Examining Division, that no final assessment of inventive step could be made (first communication issued on 29 August 1991, point 4) "Inventive Step"; and communication accompanying summons to oral proceedings, issued on 16 October 1992, point 2) "Novelty and inventive step"), that the examination of the application has not been completed.

- 5.1 Furthermore, whilst all the objections specifically raised in the written proceedings have been met in the claims of the auxiliary request, the Board is aware that there is an inconsistency in an amendment made at the initiative of the Appellant in Claims 1 and 4. This amendment involved replacing the phrase "containing at least seven carbon atoms", qualifying the number of carbon atoms in the aralkyl and aralkenyl variants of the "hydrophobic group", by wording referring to "at least five carbon atoms". This amendment, which was supported by the original disclosure and is consistent with corresponding wording in the document US-A-2 661 349, referred to in this context in the description of the application in suit (application as filed, page 6, penultimate line; printed application, page 5, lines 10, 11) was, however, carried out only at the first occurrence in each of Claims 1 and 4. Consequently, it will be for the Examining Division to ensure consistency in respect of the second occurrence, in the penultimate line of each of these claims.
- 5.2 Consequently, and in accordance with the explicit request of the Appellant, the Board has decided to make use of its powers under Article 111(1) EPC to refer the case back to the first instance for completion of all remaining aspects of the examination procedure.

Order


For these reasons it is decided that:

- 1. The decision under appeal is set aside.
- 2. The main request is rejected.
- 3. The case is remitted to the first instance for further prosecution on the basis of the auxiliary request (Claims 1 to 6 labelled "2. request") submitted during oral proceedings.

The Registrar:


E. Gorgmaier

The Chairman:


C. Gérardin



