

**Internal distribution code:**

- (A)  Publication in OJ  
(B)  To Chairmen and Members  
(C)  To Chairmen  
(D)  No distribution

**D E C I S I O N**  
of 29 May 2002

**Case Number:** T 0582/98 - 3.3.2

**Application Number:** 90202110.4

**Publication Number:** 0412607

**IPC:** A21D 8/04

**Language of the proceedings:** EN

**Title of invention:**

Retarding the firming of bread crumb during storage

**Patentee:**

DSM N.V.

**Opponent:**

Röhm Enzyme GmbH  
DANISCO A/S  
NOVO NORDISK A/S

**Headword:**

Bread crumb firming/DSM

**Relevant legal provisions:**

EPC Art. 83, 84, 113(1), 114(2), 123(2), (3)  
EPC R. 27(1)(e), 55(c), 57a, 71a

**Keyword:**

"Admissibility of opposition (yes)"  
"Admission of late filed evidence into the first instance  
opposition proceedings - discretion under Article 114(2) and  
Rule 71a correctly exercised by the opposition division"  
"Violation of the right to be heard (no)"  
"Deletion from the description of a statement referring to  
prior art documents - no violation of Article 123(3) EPC"  
"Amendments in auxiliary request VII - not supported"  
"Main request and auxiliary requests IV to VI and VIII to X -  
sufficiency of disclosure (no)"

**Decisions cited:**

-

**Catchword:**

-



Case Number: T 0582/98 - 3.3.2

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.2  
of 29 May 2002

**Appellant:** DSM N.V.  
(Proprietor of the patent) Het Overloon 1  
NL-6411 TE Heerlen (NL)

**Representative:** Matulewicz, Emil Rudolf Antonius, Dr.  
DSM N.V.  
Patents & Trademarks Department  
Office Delft 600-0240  
P.O. Box 1  
NL-2600 MA Delft (NL)

**Respondent I:** Röhm Enzyme GmbH  
(Opponent I) Kirschenallee  
D-64293 Darmstadt (DE)

**Representative:** Weisert, Annekäte, Dipl.-Ing. Dr.-Ing.  
Patentanwälte  
Kraus & Weisert  
Thomas-Wimmer-Ring 15  
D-80539 München (DE)

**Respondent II:** DANISCO A/S  
(Opponent II) Langebrogade 1  
P.O. Box 17  
DK-1001 Copenhagen K (DK)

**Representative:** Harding, Charles Thomas  
D. Young & Co.  
21 New Fetter Lane  
London EC4A 1DA (GB)

**Respondent III:** NOVO NORDISK A/S  
(Opponent III) Novo Alle  
DK-2880 Bagsvaerd (DK)

**Representative:** Bassett, Richard Simon  
Eric Potter Clarkson  
Park View House  
58 The Ropewalk  
Nottingham NG1 5DD (GB)

**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 31 March 1998  
revoking European patent No. 0 412 607 pursuant  
to Article 102(1) EPC.

**Composition of the Board:**

**Chairman:** P. A. M. Lançon  
**Members:** G. F. E. Rampold  
S. U. Hoffmann

## Summary of Facts and Submissions

- I. European patent No. 0 412 607 was granted with 11 claims in response to European patent application No. 90 202 110.4. Claims 1 and 11 of the patent as granted read as follows:
1. "Process for the production of a bread product or other cereal based foodstuffs having retarded rate of crumb firming during storage, which comprises the addition to a dough of at least one thermostable  $\alpha$ -1,6-endoglucanase or  $\alpha$ -1,4-exoglucanase in an amount which is able to modify selectively during baking the crystallisation properties of the amylopectin component and the thermostable enzyme is not inactivated during baking before the bulk of the starch has been gelatinised.
  11. Use in a dough of a thermostable  $\alpha$ -1,6-endoglucanase or  $\alpha$ -1,4-exoglucanase which is able to modify selectively during baking the crystallisation properties of the amylopectin component and the thermostable enzyme is not inactivated during baking before the bulk of the starch has been gelatinised."
- II. Notices of opposition were independently filed by respondents I, II and III seeking revocation in full of the European patent for alleged lack of novelty and inventive step, insufficiency of disclosure and added subject-matter (Article 100(a), (b) and (c) EPC).
- III. Of the numerous documents and pieces of evidence presented during the first-instance opposition and subsequent appeal proceedings, the following remain relevant to the present decision:

- (5) T. Jakibzyk et al, "Studies on the application of some amylolytic preparations in the production of wheat bread"; English Translation, pages 1-15, of Zesz. Nauk. Szk. Gl. Gospod Wiejsk. Warszawie, Technol. Rolno-Sposyw, 1973, pages 223-235;
- (7) English Translation, pages (1)-(12), of JP-A-62-79745, Application 60-216095; Filing Date 1 October 1985;
- (20) English Translation, pages (1)-(12), of JP-A-62-79746, Application 60-216096; Filing Date 1 October 1985;
- (26) G. Antranikian, "2 Microbial Degradation of Starch", pages 28-53 of "Microbial Degradation of Natural Products" ed. by G. Winkelmann, Verlag Chemie, Weinheim, 1992;

*Exhibits 1 to 8;*

all filed by respondent III during the proceedings before the opposition division on 10 February 1998;

*Exhibits A to E;*

all filed by the appellant during the appeal proceedings on 25 April 2002.

- IV. During the proceedings before the opposition division, amended sets of claims were filed by the appellant, by way of main and auxiliary requests. In the course of the oral proceedings before the opposition division, the appellant cancelled auxiliary requests II to VI and requested maintenance of the patent in amended form on the basis of the main request or the sole remaining auxiliary request I. Claim 1 in the main request was identical with claim 1 as granted. By deleting the class of  $\alpha$ -1,6-endoglucanases from the options for

thermostable enzymes envisaged in the application as filed and in the patent, all claims in the auxiliary request had been restricted to  $\alpha$ -1,4-exoglucanases as the sole class of enzymes to be used in the claimed process.

V. The opposition division revoked the European patent pursuant to Article 102(1) EPC. In its decision it concluded that the appellant's objections against the admissibility of the oppositions were unfounded. Concerning sufficiency of disclosure, the opposition division found that the disclosure of the claimed invention in the patent in suit would have been insufficient to enable a skilled person to obtain, without undue burden, an  $\alpha$ -1,6-endoglucanase, eg a pullulanase, which might be suitable for carrying out the claimed process and for achieving the desired result. Consequently, it rejected the main request under Article 83 EPC. As to the auxiliary request, the opposition division held that all the technical features of claim 1 were already either explicitly or implicitly disclosed in citation (5) and rejected this request for lack of novelty.

VI. The appellant lodged an appeal against the decision of the opposition division and filed a statement setting out the grounds of appeal. Together with a faxed letter dated 25 April 2002, ie about one month before the fixed date for the oral proceedings, the appellant presented further written submissions, which included in Exhibits A-D some new pieces of experimental evidence. At the same time, the appellant filed a new set of eleven requests, wherein the main request and the auxiliary requests I to V and IX were the same as those in the proceedings before the opposition division and four new auxiliary requests (the sixth, seventh, eighth and tenth) had been added.

In auxiliary request VI, the subject-matter of claims 6 to 10 as granted had been withdrawn. In auxiliary request VII, claims 1, 4 and 5 were amended by the statement that the  $\alpha$ -1,4-exoglucanase did not have significant  $\alpha$ -amylase activity. In auxiliary request VIII, claims 1, 4 and 5 were amended in that the enzyme used only comprised an  $\alpha$ -1,4-exoglucanase. Finally, auxiliary request X contained a set of claims wherein the claimed invention was formulated in the form of use-claims and wherein the enzyme used only comprised an  $\alpha$ -1,4-exoglucanase.

- VII. On 26 November 1998 respondent III withdrew its opposition to the grant of the patent.
- VIII. In a letter dated 18 March 2002, respondent I informed the Office that it would not attend the oral proceedings.
- IX. Oral proceedings were held on 29 May 2002. At the beginning of the oral proceedings, the appellant, while maintaining the main request and auxiliary requests IV to X, cancelled auxiliary requests I to III. As a result of the board's views as expressed early on during the oral proceedings, the appellant deleted unconditionally the statement which had been added to the description during the examination proceedings at the bottom of column 2, lines 53 to 58, and which had been attacked by the respondents under the terms of Articles 100(c) and 123(2) EPC.
- X. Concerning the issues addressed in this decision, the appellant argued in its written submissions and during oral proceedings before the board essentially as follows:

The notices of opposition of all respondents I, II, and III were insufficient under the terms of Rule 55(c) EPC. In the present case the decision to revoke the patent on the ground of lack of novelty and insufficiency of disclosure was, according to the appellant, essentially based on facts and evidence submitted about one month in advance of the oral proceedings before the opposition division. In spite of the fact that the most relevant pieces of evidence, such as exhibits 1 to 7 and document (26), had been filed only about one month before the fixed date for the oral proceedings, the opposition division did not accede to any of the appellant's procedural requests presented during the hearing.

As far as the ground of opposition under Article 100(c) EPC was concerned, the application as filed included in the description a reference to the test (ie A. E. Baker et al, in Cereal Foods World, vol. 32, no. 7 (1987), 486) which was used to determine the ratio of the firmness of the bread product indicated in claim 6. It was well known in the art and explicitly stated in the cited reference, that said test was to be performed at room temperature and that the bakery product to be tested should be stored at room temperature. The insertion in claim 6 "*followed by cooling down to room temperature and storage at room temperature*" was thus adequately supported by the originally filed documents.

The requirement of Rule 27(1)(e) EPC that the description shall describe in detail at least one way of carrying out the invention claimed did not automatically mean that the disclosure was insufficient and did not meet the requirements of Article 83 EPC, if the invention was not illustrated by way of one or more specific examples. According to the established case law of the boards of appeal, the presence of a specific example in the specification was not required by the

EPC. In the present case it was sufficient that the specification contained a list of particular microorganisms from which the skilled person was able, on the basis of his common general knowledge, to isolate appropriate enzymes for use in the claimed invention. Moreover, the respondents failed to provide convincing evidence, let alone real proof, to show in an unequivocal manner that the disclosure was indeed insufficient. On the contrary, the respondents themselves had shown in their exhibits that they were able to find appropriate enzymes and accordingly to carry out "the invention".

XI. The submissions of the respondents presented in writing or orally, which are relevant to the particular issues addressed in this decision, can be summarised as follows:

Nowhere in the application as filed was it specified that the ratio given in product claim 6 was to be determined on a bread product originating from baking a batter or dough, *followed by cooling down to room temperature and storage at room temperature*. Moreover, there was no basis anywhere in the application as filed for a use claim of the type presented as claim 11 of the main request.

The statement at the bottom of column 2 of the patent could only be construed to mean that both classes of enzymes, viz.  $\beta$ -amylases and amyloglucosidases, were found to be unsuitable for use in the claimed process and their use was therefore excluded from the protection conferred by the claims as granted. Its deletion had consequently the effect that the protection conferred by the claims as granted would be extended. This resulted in a violation of Article 123(3) EPC.



As to the oppositions under Article 100(b) EPC, the respondents argued that the disclosure of the claimed invention was non-enabling. No specific example was given. All that was provided was an entirely theoretical figure showing the desired effect of retardation of the rate of crumb firming when compared with reference bread and a bread showing the effect of the addition of  $\alpha$ -amylase. The alleged effects shown in this figure had, however, no experimental basis and did not reflect any actual experimental data.

The claims as granted referred to the addition of an  $\alpha$ -1,6-endoglucanase or an  $\alpha$ -1,4-exoglucanase. However, no specific example of an enzyme was given which had the desired characteristics within either of these two broad groups of starch hydrolases. The specification merely mentioned that amyloglucosidases and  $\beta$ -amylases could be examples of  $\alpha$ -1,4-exoglucanases and referred the reader to a list of three groups of microorganisms from which those skilled in the art were invited to commence their search for an appropriate enzyme.

Despite the fact that claim 1 related to a process for the production of a bread product, no steps involved in the preparation process were given. Claim 1 required that the enzyme was present *"in an amount which was able to modify selectively during baking the crystallisation properties the amylopectin component"*. No guidance was given to the skilled person as to how one would test whether an enzyme was able to modify selectively the crystallisation properties of the amylopectin component. This feature of the claim would appear to define a concentration. From the patent it was, however, clear that any amount of enzyme would have this property. The only way this feature placed any limit on the concentration was if it meant that the

enzyme must be present in an amount sufficient to modify all of the amylopectin component. This was, however, not said.

- XII. The appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of the claims in the main request or on the basis of the claims in one of the auxiliary requests IV to X, all filed on 25 April 2002.

The respondents requested that the appeal be dismissed.

### Reasons for the Decision

1. The appeal is admissible.

#### *Admissibility of oppositions*

2. Under Rule 55(c) EPC the notice of opposition must contain three items: a statement (1) of the extent to which the European patent is opposed and (2) of the grounds on which the opposition is based as well as (3) an indication of the facts, evidence and arguments presented in support of these grounds.
- 2.1 According to the established case law of the boards of appeal (see, for example, Case Law, 4th edition 2001, VI.C.8.5, pages 468-475), requirement (3) of Rule 55(c) EPC is satisfied if the contents of the notice of opposition are sufficient for the opponent's case to be properly understood on an objective basis by the patentee and the opposition division. In other words, the contents of a notice of opposition are considered sufficient if the proprietor and the opposition division are able to form a definitive opinion on at least one ground of opposition invoked by the opponent.

Contrary to what the appellant appears to suggest in its submissions, for an opposition to be admissible it is not necessary that the patent could have been revoked on the basis of the facts, evidence and arguments presented in the notice of opposition before the expiry of the nine-month opposition period. Rule 55(c) EPC does not prescribe such a complete indication of the facts, evidence and arguments as to permit a conclusive examination on that basis alone.

- 2.2 As to requirement (1), respondents I and II had clearly indicated that the opposition was filed against the patent as a whole by placing a cross against Box V in EPO Form 2300.2. Similarly, respondent III requested expressly in its notice of opposition that all claims 1 to 11 for all contracting states be revoked.

Concerning requirement (2), in their notices of opposition all respondents I to III invoked expressly Article 100(a) in conjunction with Articles 54 and 56 EPC and Article 100(b) in conjunction with Article 83 EPC as grounds for opposition. The opposition of respondent III was additionally explicitly based on Article 100(c) in conjunction with Article 123(2) EPC as a further ground of opposition.

- 2.3 Turning now to requirement (3): The contents of each of the three notices of opposition enabled the skilled reader to follow a readily comprehensible line of argument explaining why all the respondents I to III, independently of each other, concluded

- (a) that the subject-matter of the claims indicated in the notices of opposition lacked novelty or inventive step and
- (b) that the disclosure of the claimed invention in the patent in suit was insufficient.

In the notice of opposition submitted by respondent III, the ground for opposition under Article 100(c) EPC was likewise based on reasoned arguments leading respondent III to the conclusion that the subject-matter of the opposed patent extended beyond the content of the application as filed.

- 2.4 Further, the grounds for opposition and the arguments set forth in the notices of opposition were *per se* properly supported by sufficient and appropriate evidence filed together with the actual notices of opposition, that is to say citations numbered (1) to (4) in the present proceedings submitted by respondent I, citations numbered (5) to (19) submitted by respondent II and citations numbered (4), (7) and (20) to (23) submitted by respondent III.
- 2.5 The requirements laid down in Rule 55(c) EPC in relation to the admissibility of opposition must not be mixed up with the regulations for the admissibility of late filed evidence and its admission into the proceedings before the opposition division. In accordance with Article 114(2) and Rule 71a EPC, it was within the discretion of the opposition division to admit publication (26) and exhibit 7 into the proceedings and to base its decision, *inter alia*, on both these pieces of evidence, even if they had been presented by respondent III only shortly before the final date fixed in the opposition division's communication under Rule 71a EPC (in this respect see also point 3 below).
- 2.6 Finally, even if, as in this case, respondent III adopted in the course of the ongoing opposition proceedings certain arguments as to lack of novelty of the claimed subject-matter in the patent, which had originally been presented by respondent II in its notice of opposition, and developed these arguments by

the submission of further evidence, this neither renders the notice of opposition of either respondent II or respondent III insufficient, nor does it make the oppositions based on Article 100(a) EPC on the ground of lack of novelty inadmissible.

- 2.7 Consequently, the board concurs with the finding of the opposition division in the decision under appeal that all three oppositions and likewise all grounds for opposition invoked by respondents I to III are admissible.

*Late-filed evidence; Right to be heard*

3. The board considers that the opposition division exercised its discretion under Article 114(2) and Rule 71a EPC correctly in admitting publication (26) and exhibit 7 into the first instance opposition proceedings, in spite of the fact that both these pieces of evidence were filed one month in advance of the fixed date for the oral proceedings before the opposition division.
- 3.1 In the decision under appeal (see especially point 5) it is correctly pointed out that exhibit 7, which is a product sheet describing on two pages the nature and properties of the enzyme Sprit Amylase Novo (hereinafter referred to as "SAN"), was filed to counter certain arguments which had earlier been introduced by the appellant into the opposition proceedings, namely that Amyloglucosidase Novo ["AMG" the product sheet of which had already been submitted as document (6) with the notice of opposition] was not identical with SAN in its composition. Similarly, by filing publication (26), which is an extract from a post-published text book reflecting the common general knowledge at the priority date in the field of microbial degradation of starch, respondent III was

simply reacting to some of the appellant's earlier submissions and its previous comments on the facts, arguments and evidence as to insufficiency of disclosure already presented by the respondents in their notices of opposition.

3.2 It is thus in the board's opinion clear that admitting publication (26) and exhibit 7 into the opposition proceedings, did not materially affect or change the existing state of evidence and, given its own arguments, submissions and comments, the appellant could not have been taken by surprise by the contents of these documents. Moreover, the appellant was given sufficient time to consider these documents before the fixed date for the hearing. It could be expected to be able to understand immediately the contents and relevance of both these documents and, if necessary, to react to the new situation either by presenting its counter-arguments during the oral proceedings or by filing amended claims. The board is thus satisfied that in the present case the appellant's right to be heard (Article 113(1) EPC) in the first instance opposition proceedings was not contravened by the late submission of these documents. Consequently, the decision of the opposition division to reject the appellant's request that the oral proceedings be postponed did not, in the board's judgment, constitute a procedural violation.

3.3 The board also considers that not only publication (26) and exhibit 7 but also exhibits 1 to 6 and 8, all filed by respondent III on 10 February 1998, ie one month in advance of the oral proceedings before the opposition division, and likewise exhibits A to E, all filed by the appellant on 25 April 2002, ie about one month in advance of the oral proceedings before the board, should be admitted as evidence in the appeal proceedings. As regards the earlier set of exhibits, these were made available to the appellant already

during the first instance opposition proceedings and the board sees no reason why they should not be considered in the appeal proceedings. As regards the second sets of exhibits, the appellant's assertion that these formed a response to the respondents' exhibits submitted late in the first instance opposition proceedings appears *prima facie* correct. That said, the appellant's exhibits A to E were submitted only shortly before the fixed date for the oral proceedings before the board, that is to say more than three-and-a-half years after the statement of grounds of appeal had been filed, and the board does not condone such lateness *per se*. However, in the circumstances of this case, the respondents had nevertheless one month in which to consider and prepare arguments in reply to the late evidence. The respondents were given ample opportunity during the oral proceedings to present their arguments and comments on the appellant's exhibits before the board (Article 113(1) EPC). Coupled with the fact that the respondents to a large extent prompted such evidence by their own exhibits and that the presentation of the appellant's exhibits allows, in the board's judgment, a more balanced and fair assessment of the evidence provided by the parties on either side, the board exercises its discretion in favour of the appellant.

*Admissibility of the appellant's requests*

4. The sets of claims in the currently valid main request and auxiliary requests IV to X were filed one month in advance of the oral proceedings. These sets of claims contain only minor amendments compared to the claims as granted and the sets of claims in the requests presented in the proceedings before the opposition division and should therefore be admitted for consideration in this appeal. The amendments to the claims and the description effected during the

opposition and subsequent opposition appeal proceedings can fairly be said to be occasioned by grounds for opposition specified in Article 100 EPC and are thus also admissible under the terms of Rule 57a EPC.

*Clarity of the amended claims*

5. During the hearing, respondent II under Article 84 EPC questioned, *inter alia*, the clarity of the newly introduced functional feature at the end of claim 6 in the main request. The attacked feature reads as follows: "and wherein the enzyme does not significantly affect the initial firmness of the bread crumb directly after cooling". A similar feature was introduced into claims 5 and 7 to 10 of auxiliary request IV. Although the board considers that a more precise formulation of this functional feature would, in principle, be desirable, it is convinced that the above-mentioned claims are at least sufficiently clear for this issue of clarity raised by the respondents not to be crucial to the understanding of the other issues and, in view of the board's decision on the further matters referred to below, no final decision on this issue is necessary in this case.

*Added subject-matter*

6. As regards the amendments which were introduced into the application documents before grant and attacked by the respondents under Article 100(c) EPC in conjunction with Article 123(2) EPC, the objection to the insertion of the statement at the bottom on page 2 of the description was rendered superfluous by the deletion of that statement during the oral proceedings before the board (see paragraph IX above). The board is unable to share the opinion of respondent II expressed at the oral proceedings that deletion of this statement resulted in a violation of Article 123(3) EPC. The



statement in question contained an incorrect and subjective evaluation of the state of the art which had no objective factual basis in the prior art documents quoted in preceding paragraphs in column 2, lines 44 to 53 to which this statement referred, but did not form part of the disclosure as such of the claimed invention in the patent as granted. Its deletion was thus necessary to comply with the provisions of Article 123(2) EPC but this had no effect on the scope of protection conferred by the claims. Consequently, deletion of the attacked statement could not result in an extension of the protection conferred by the claims as granted and in a violation of Article 123(3) EPC.

6.1 Concerning the other objections raised by the respondents under Article 100(c) EPC and referred to in paragraph XI above, the board cannot recognise any alleged contravention of Articles 100(b) and 123(2) EPC.

In particular, claim 6 as amended refers in the context of determining the firmness to a method, which is already described in the application as filed by reference to the original document disclosing said method (see page 6, lines 7 to 13). The appellant has credibly explained that this method is described in the cited reference and moreover commonly known as being applied at room temperature as has been specified in the amended claims.

6.2 Similarly, the person skilled in the art would find, in the board's judgment, all technical features of the use claims [of the type presented as claim 10 in the main

request or as claim 11 in the patent as granted] at least implicit in what is expressly disclosed in the application as filed.

*Auxiliary request VII*

7. Claims 1, 4 and 6 in auxiliary request VII have been amended so as to replace the original definition of the enzymes reading "at least one thermostable  $\alpha$ -1,6-endoglucanase or  $\alpha$ -1,4-exoglucanase" in the claims of the patent as granted with "at least one thermostable  $\alpha$ -1,6-endoglucanase with no significant  $\alpha$ -amylase activity, or at least one  $\alpha$ -1,4-exoglucanase".
- 7.1 The proposed amendment, which relates to the exclusion of  $\alpha$ -amylase activity from the  $\alpha$ -1,6-endoglucanases used as the active enzyme in the claimed process, is, however, neither explicitly nor implicitly derivable from the application as filed. On the contrary, the application as filed envisaged *expressis verbis* the possibility of adding, *inter alia*, small amounts of a cereal/bacterial  $\alpha$ -amylase to achieve a somewhat higher starting softness when the option of a relatively long storage time is desired (see especially page 7, lines 19 to 23).
- 7.2 The conclusion must be drawn that the patent as granted was amended in auxiliary request VII in such a way that it contains subject-matter which finds no support in the originally filed documents and which consequently extends beyond the content of the application as filed. This constitutes an infringement of Article 123(2) EPC. It follows that auxiliary request VII cannot succeed.

*Main request; Auxiliary requests IV to VI and VIII to X*

8. As regards the above-mentioned requests, it appears appropriate to make the following preliminary remarks. As is apparent from paragraph I above, the claims as granted related in a first embodiment to the addition of an  $\alpha$ -1,6-endoglucanase and in a second embodiment to the addition of an  $\alpha$ -1,4-exoglucanase as the active enzymes in the claimed process. Whereas said first embodiment was excised during the appeal proceedings from all claims in auxiliary requests VIII and X, all currently valid requests, ie the main request and auxiliary requests IV to VI and VIII to X, continue to include the said second embodiment, that is to say the addition or use of an  $\alpha$ -1,4-exoglucanase as the active enzyme. Therefore the board has decided to continue the examination of the issue of sufficiency in relation to that second embodiment.

*Sufficiency of disclosure and support*

9. Objections on these grounds centre in the present case on the non-availability of appropriate enzymes for the claimed process or the claimed use on the basis of the disclosure in the patent.
- 9.1 Turning now to the patent, the board observes that the specification contains no exemplification whatsoever. In particular, no specific example at all of an  $\alpha$ -1,4-exoglucanase within this broad group of starch hydrolases is given which would have the desired properties and would enable one to achieve the desired effects set out in the claims. Nor is there a specific example available of the claimed process for the production of a bread having a retarded rate of crumb firming wherein an  $\alpha$ -1,4-exoglucanase as the active enzyme has been used.

In the absence of any specific example, the specification discloses in merely general terms that both  $\beta$ -amylase or amyloglucosidase can be used in the claimed process as the thermostable  $\alpha$ -1,4-exoglucanases (see column 3, lines 34 to 36: "*Furthermore thermostable  $\alpha$ -1,4-exoglucanases like  $\beta$ -amylase or amyloglucosidase can also be used*").

9.2 The description goes on to state (see column 3, lines 36 to 50) that "these exoamylases are able to split off glucose (amyloglucosidase) or maltose ( $\beta$ -amylase) from the non-reducing chain-ends of amylose and amylopectin. The tendency to recrystallize depends mainly on the mean chain length of the linear  $\alpha$ -1,4-carbohydrate chains of amylose and amylopectin. Because the mean chain length of the linear  $\alpha$ -1,4-side chains in amylopectin is much smaller than the mean chain length of amylose (15-50 and 500-2000 glucose units, respectively), these exoenzymes [ie  $\beta$ -amylase and amyloglucosidase] will rather selectively reduce the tendency of amylopectin to recrystallize. In contrast the crystallization properties of amylose will hardly be affected by these exoenzymes after removing 5-15 glucose units from the long amylose chain".

This disclosure in the patent can only be interpreted by the skilled reader as teaching that the capacity to selectively act on amylopectin (when amylose and amylopectin are both present) is an inherent feature of an  $\alpha$ -1,4-exoglucanase like  $\beta$ -amylase or amyloglucosidase as such.

9.3 Both enzymes  $\beta$ -amylase and amyloglucosidase have already been used in the closest state of the art as the active enzymes for the same purpose as that described in the patent, or a similar purpose.

Thus, citation (5) teaches that addition to a dough prior to baking of 0.37% Spirit Amylase Novo (SAN), the active enzyme of which is the  $\alpha$ -1,4-exoglucanase amyloglucosidase (see (5): especially page 3, Materials and methods, entry 2), results in a bread which shows a significantly retarded rate of staling during storage at room temperature over a period of 3 and 6 days (see page 10, Figure 4, central column). As is clear from the disclosure in the patent (see column 1, line 13), one of the most important features of staling of bread products is an increase in the firmness of the crumb. Consequently, a bread which shows a significantly retarded rate of staling during storage at room temperature would normally be expected on the basis of the above disclosure in the patent to have a retarded rate of crumb firming during storage at room temperature.

In example 1 of citation (7) [see especially pages (6) to (8)] and citation (20) [see pages (6) to (8)] the effects of adding soy bean  $\beta$ -amylase (10-40 U/g), *Bacillus stearothermophilus*  $\beta$ -amylase (No 2718) (2.5-10 U/g) and *Bacillus megaterium*  $\beta$ -amylase (IFO 300) (2.5-10 U/g) to bread dough prior to baking are disclosed. All three  $\beta$ -amylase enzymes caused a significant improvement in the palatability of the bread after 4 and 8 days storage (see citation (7), page (7), Results; citation (20), page (7), Results). The patent states in lines 34 to 37 of column 1 that "increase in crumb firmness, which is considered as the most important aspect of staling, is recognized by the consumer a long time before the bread product has become unsuitable for consumption". It can thus fairly be said that the improvement in palatability observed in (7) and (20) would be perceived by the consumer as the result of a retarded rate of crumb firming. All three  $\beta$ -amylase enzymes are explicitly described in the

cited documents as having high thermostability [see citation (7), end of page (3); citation (20), end of page (3)] and all of them, when added to bread dough prior to baking, cause a significant improvement in the palatability of the bread during storage.

The patent likewise relates to a method for the production of a bread product having a retarded rate of crumb firming. Said method comprises addition to a dough prior to baking of either amyloglucosidase or  $\beta$ -amylase as the active enzymes. Both these enzymes are described in the specification as being examples of thermostable  $\alpha$ -1,4-exoglucanases ("*thermostable  $\alpha$ -1,4-exoglucanases like  $\beta$ -amylase or amyloglucosidase can be used*", *loc. cit.*) having the inherent capacity of selectively reducing the tendency of amylopectin to recrystallize (see point 9.2 above)

9.4 It thus appears clear, in the board's judgment, that a skilled person, when comparing the state of the art according to (5), (7) or (20) with the features of the patent, would necessarily conclude that each of the citations (5), (7) and (20) *prima facie* anticipates all features of the appellant's alleged invention and each is therefore prejudicial to the novelty of the claimed subject-matter in the patent.

9.5 In sharp contrast to the above conclusion the skilled reader would have drawn, the appellant essentially argued in its written submissions and at the hearing that none of the  $\beta$ -amylase or amyloglucosidase enzymes disclosed in the closest state of the art were among those contemplated by the patent.

In particular the appellant argued that citation (5) taught only the effects of amylolytic enzyme preparations on the dough. In spite of the clear and unequivocal teaching in (5) that the active enzyme

contained in SAN is the  $\alpha$ -1,4-exoglucanase amyloglucosidase (*loc. cit.*) and the disclosure in the patent that the capacity to selectively act on amylopectin is an inherent feature of the  $\alpha$ -1,4-exoglucanase amyloglucosidase (*loc. cit.*) [and San must therefore have this property], the appellant submitted in the grounds of appeal and at the oral proceedings that SAN behaved in (5) like  $\alpha$ -amylase, typically an enzyme leading to a too soft, too spongy fresh bread. According to the appellant, there was no disclosure in (5) of an  $\alpha$ -1,4-exoglucanase enzyme activity, retarded rate of crumb firming, selective modification of amylopectin or thermostability of the enzyme during baking before the bulk of starch has been gelatinised.

Similarly, concerning the  $\beta$ -amylase enzymes used in (7) and (20), the appellant argued, *inter alia*, that these enzymes were different in their properties from a  $\beta$ -amylase suitable for the claimed invention in that they showed a significant starch degrading ability below the gelatinisation temperature of starch. According to the appellant, the principal teaching of the cited documents was the ability of the  $\beta$ -amylase enzymes, which are added in (7) and (20) to a dough, to act on starch below the gelatinisation temperature. In spite of the explicit disclosure in both cited documents that the  $\beta$ -amylase enzymes used in (7) and (20) have high thermostability (*loc. cit.*) the appellant speculated that their data on thermal stability suggested that these enzymes would possibly be thermolabile at the temperatures at which the patent required the enzymes to be thermostable and active. Further, in spite of the disclosure in the patent that the capacity to selectively act on amylopectin is an inherent feature of the  $\alpha$ -1,4-exoglucanase  $\beta$ -amylase, the appellant also

asserted that citations (7) and (20) taught the use of the 2718  $\beta$ -amylase or (IFO 300)  $\beta$ -amylase to prevent retrogradation of amylose, not amylopectin.

9.6 To summarise the board's observations in the foregoing points: The person skilled in the art, having objectively considered the information disclosed in the patent and his own knowledge of the state of the art provided by citations (5), (7) and (20), would then, when faced with the appellant's submissions pointing in the opposite direction, find himself in a state of confusion.

9.7 Even if, for the sake of argument and in the appellant's favour, the board were to accept the appellant's assertions that the known amyloglucosidase and  $\beta$ -amylase enzymes were not examples of  $\alpha$ -1,4-exoglucanases within the meaning and scope of the patent, and that the cited documents did not therefore prejudice novelty, this would not help the appellant for the simple reason that in this case the disclosure is insufficient. The disclosure in the patent is entirely silent about the availability of appropriate alternatives to the enzymes described in the cited state of the art.

9.8 The only information provided in the specification is a statement in column 4, lines 31 to 36, that "thermostable exo amylases are, for example, produced by the following organisms

Clostridium thermosulfurogenes ( $\beta$ -amylase)  
Bacillus stearothermophilus ( $\beta$ -amylase)  
Clostridium thermohydrosulfuricum (amyloglucosidase)".

The board fully concurs with the respondents' submissions that this information is nothing more than an invitation to those skilled in the art to start



searching for an appropriate enzyme. At first glance the list in the patent may seem to be a list of three specific microorganisms, but that is not the case. The list refers to three groups of microorganisms each of which embraces a large number of individual strains. As the respondents have demonstrated by the submission of the document "American Type Culture Collection, Catalogue of Strains I", Fifteenth Edition (1982), page 80, the ATTC collection listed in 1982, for example, 13 *Bacillus stearothermophilus* strains. It appears clear that not all of these strains comprise a  $\beta$ -amylase enzyme, let alone one which has all the desired properties.

Once an individual strain of microorganism has been chosen, the skilled person is provided with no information in the specification on how to screen for amyloglucosidase or  $\beta$ -amylase activity. It is clear from (26) that screening for  $\beta$ -amylase activity was not trivial even two and a half years after the priority date. Lines 8 to 10 in the left-hand column on page 39 of (26) state that "the reason for finding so few  $\beta$ -amylase producers is the lack of a simple screening method".

Even if, for the sake or argument, the skilled person were to stumble on a strain of microorganism which seemed to contain an enzyme of the desired class, absolutely no information is provided in the specification on how to produce and subsequently isolate and purify the enzyme.

In particular, the skilled person is given no technical guidance or instructions in the specification enabling him, starting from any of the above-mentioned microorganisms, to arrive with a reasonable expectation of success at a  $\beta$ -amylase enzyme or an amyloglucosidase enzyme having just the desired properties, said enzyme

being virtually free of the allegedly different and undesired properties of the known  $\beta$ -amylase enzymes disclosed in citations (7) and (20) or the known amyloglucosidase enzyme disclosed in (5), making all these known enzymes, according to the appellant's assertions, unsuitable for use in the claimed invention. There is, for example, no information available on how to arrive, starting from a Bacillus stearothermophilus microorganism, at a *Bacillus stearothermophilus*  $\beta$ -amylase which is different from the *Bacillus stearothermophilus*  $\beta$ -amylase used in (7) and has, moreover, the specific properties required for the patent.

- 9.9 The board has carefully considered the appellant's exhibits C and D. Exhibit C was submitted to show that amyloglucosidase produced from *a. niger* displays acid amylase activity. However, exhibit C contains no information on how to purify the enzyme and to isolate a pure amyloglucosidase enzyme having the desired properties.

Exhibit D refers to the effects of a  $\beta$ -amylase from *Clostridium thermosulfurogenes* on crumb firmness. However, the exhibit is entirely silent about any details of the actual strain used, the screening method and the methods used for the isolation and purification of the enzyme. Moreover, no proof was given that this particular enzyme was already available to the public at the filing date of the patent.

### Conclusion

10. To summarize, it appears clear that the claims of the patent put forward nothing more than a mere obvious *desideratum*. For the reasons set forth above, the invention as claimed either in the main request or in any of the auxiliary requests IV to VI and VIII to X

cannot, in the board's judgment, be performed by a person skilled in the art, on the basis of the disclosure within the whole area claimed, without undue burden, which pursuant to Article 100(b) EPC prejudices the maintenance of the patent.

## Order

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:

A. Townend

P. A. M. Lançon

