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**Datasheet for the decision  
of 4 December 2007**

**Case Number:** T 1256/05 - 3.3.06

**Application Number:** 95924291.8

**Publication Number:** 0766727

**IPC:** C11D 3/386

**Language of the proceedings:** EN

**Title of invention:**

Cleaning method based on compositions containing a hemicellulase plant cell wall degrading enzyme and the use thereof in cleaning methods

**Patentee:**

GENENCOR INTERNATIONAL, INC.

**Opponent:**

NOVOZYMES A/S

**Headword:**

Cleaning enzyme/GENENCOR

**Relevant legal provisions (EPC 1973):**

EPC Art. 54, 56

**Keyword:**

"Novelty (main request) - no: restrictive interpretation of claim not justified"

"Inventive step (auxiliary requests 1 and 2) - no: obvious alternative"

**Decisions cited:**

-

**Catchword:**

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Case Number: T 1256/05 - 3.3.06

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.06  
of 4 December 2007

**Appellant:** GENENCOR INTERNATIONAL, INC.  
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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 1 August 2005  
revoking European patent No. 0766727 pursuant  
to Article 102(1) EPC.

**Composition of the Board:**

**Chairman:** P.-P. Bracke  
**Members:** P. Ammendola  
A. Pignatelli

## Summary of Facts and Submissions

I. This appeal is from the decision of the Opposition Division to revoke the European patent No. 0 766 727 concerning a cleaning method based on compositions containing a hemicellulase plant cell wall degrading enzyme and the use thereof in cleaning methods.

II. Claims 1 and 14 of the patent as granted were independent and read:

"1. *Use of a cleaning composition comprising a hemicellulase which is capable of degrading plant cell walls for removing stains comprising plant cell wall components from an object or a surface.*"

and

"14. *A method of cleaning an object or a surface having unwanted residues of vegetable origin, the method comprising contacting the object or surface with a composition comprising a hemicellulase which is capable of degrading plant cell walls.*"

III. The Opponent had sought revocation of the patent in suit on the grounds of lack of novelty and inventive step (Article 100(a) in combination with Articles 52(1), 54 and 56 EPC) by relying, *inter alia*, on

document (2) = WO 92/16685

document (6) = De Costa *et al.* "Microbiology of Extreme Environments and its Potential for Biotechnology",

Elsevier Applied Sci. Ed., 1988,  
pages 346 to 366;

document (18) = Blanshard *et al.* "Polysaccharides  
in Food", Butterworths, 1979,  
pages 93 to 109;

document (19A) = an English translation of  
JP-A-60 226 599;

document (22) = Cutler *et al.* "Detergency Theory  
and Technology", Marcel Dekker  
Inc., 1979, pages 1 to 89.

IV. The Opposition Division had found, *inter alia*, that the subject-matter of the granted claim 1 was novel vis-à-vis the disclosure of document (2), but lacked inventiveness in view of the common general knowledge recalled in document (22) that the removal of stains by means of cleaning compositions might be favoured introducing in these latter hydrolytic enzymes apt at degrading components of the stains to be removed.

V. The Patent Proprietor (hereinafter "Appellant") lodged an appeal against this decision and filed with the grounds of appeal two sets of amended claims as auxiliary requests 1 and 2.

Claim 1 of the **auxiliary request 1**, differed from claim 1 as granted (see above section II) only in that the wording "*wherein the hemicellulase is a xylanase, an alkaline mannanase or a lichenase.*" was added at the end of the claim.

Claim 1 of the **auxiliary request 2**, differed from claim 1 as granted (see above section II) only in that the wording "*, wherein the hemicellulase is a xylanase or a lichenase.*" was added at the end of the claim.

- VI. The Opponent (hereinafter "Respondent") replied to the grounds of appeal by, *inter alia*, maintaining the objection to the novelty of the patented subject-matter based on document (2).
- VII. Oral proceedings took place before the Board in the presence of both parties on 4 December 2008.
- VIII. In respect of the novelty of claim 1 as granted the Appellant considered evident that the wording "*cleaning*" as used therein, when interpreted in the light of the whole patent disclosure, would exclusively refer to the removal of the stains of vegetable origin normally present on worn clothing, used kitchenware, soiled tiles, etc. in the household of the final consumer (hereinafter these stains will be indicated as "the conventional stains"). Hence, the patented use would be limited to household applications, distinct from the industrial "*washing*" process disclosed in document (2) for removing residues of printing paste from printed textiles.

In respect of the inventiveness of the use of xylanase-containing cleaning compositions defined in claim 1 according to each of the auxiliary requests 1 and 2, the Appellant stressed that examples of the patent in suit would prove the surprising efficacy of cleaning compositions based on hemicellulases, such as e.g. the tested xylanases, in removing stains of vegetable origin. The skilled person starting from conventional cleaning

compositions containing enzymes of the prior art that are referred to e.g. in document (22), could not foresee this superior cleaning efficacy. On the contrary, the acidic pH used in the examples of document (2) would prove the existence of a prejudice against the applicability of hemicellulases in cleaning compositions, because these latter would normally be alkaline. Moreover, a lack of efficacy of hemicellulase-containing cleaning compositions would rather be suggested by the example of document (19A) containing an hemicellulase as the sole enzyme.

- IX. The Respondent refuted these arguments by maintaining, *inter alia*, that the broad definition of claim 1 as granted encompassed the process of washing out unwanted dye paste residues from printed textiles disclosed in claim 6 of document (2).

The patent in suit contained no data that allowed to compare the extent of removal of conventional stains of vegetable origin provided by the hemicellulase-containing cleaning compositions of the invention with that already achieved by the conventional prior art cleaning compositions also based on enzymes.

Hence, the use of xylanase-containing cleaning compositions encompassed by claim 1 of each of the Appellant's auxiliary requests only solved the technical problem of providing an alternative to the prior art.

Since hemicellulases in general, and in particular xylanase enzymes, were known to degrade components of conventional stains of vegetable origin, the claimed

subject-matter would represent an obvious solution to the posed problem.

The Respondent disputed the existence of any generally accepted prejudice against the possibility of using hemicellulases in alkaline cleaning compositions. On the contrary, the fact that alkaliphilic hemicellulases, such as certain xylanases, were already known and had already been considered in the field of detergents was proved by document (6).

Moreover, the teaching of document (2) was not limited to the acidic pH used in its examples and document (19A) would rather teach to the skilled reader that hemicellulases could even surprisingly contribute to the cleaning of stains having no vegetable origin if used in combination with cellulases.

- X. The Appellant requested that the decision under appeal be set aside and the patent be maintained as granted or, alternatively, on the basis of the claims according to any of the auxiliary requests 1 or 2 filed under cover of the grounds of appeal.

The Respondent requested that the appeal be dismissed.

## Reasons for the decision

### *Appellant's main request*

1. Novelty of claim 1 as granted (Article 100(a) EPC in combination with Articles 52(1) and 54 EPC)
  - 1.1 This claim defines the use of a cleaning composition comprising a hemicellulase for removing stains comprising plant cell wall components from an object or a surface (see above section II of the Facts and Submissions).
  - 1.2 The Respondent has maintained that the broad definition of the claimed use embraced also the use of textile washing compositions containing enzymes disclosed in document (2) for removing residues of printing thickener and excess dye left on textiles during a preceding printing step.

In particular, the Respondent has referred to claim 6 of this citation that discloses the method of washing textiles that have been printed by using a galactomannan hemicellulose (i.e. undisputedly a plant cell wall component) as printing thickener, with aqueous solutions containing endo-1,4- $\beta$ -D-mannanase (i.e. a hemicellulase specifically hydrolysing galactomannans).

- 1.3 The Appellant has argued, instead, that the skilled reader of the patent in suit would interpret claim 1 in view of the whole patent disclosure and, thus, would conclude that the claimed use regards exclusively household applications of the hemicellulase-containing "*cleaning*" compositions, i.e. that the stains to be



removed by the claimed use are exclusively the conventional ones of vegetable origin normally present on clothing, kitchenware, tiles, etc. in the final consumer's household.

On the contrary, the method of document (2) would be an industrial "*washing*" step for removing residues left on textiles by a preceding industrial printing step, whereby this "*washing*" advantageously precedes any cleaning carried out by the final consumer (see document (2) page 1, lines 3 to 21). This would also imply the substantial difference that, whereas the method of the prior art required the matching of the enzyme with the specific material to be removed, in the claimed use the cleaning composition would help in removing a serendipity of stains.

1.4 The Board notes that the Appellant's reasoning amounts to a restrictive interpretation of the expressions "*cleaning composition*" and "*stains*" in the patent claim. However, such a restrictive interpretation does not correspond to any precise definition directly and unambiguously disclosed in the granted patent.

1.4.1 In particular, paragraph 5 therein only mentions an usual definition of stains present onto fabric, but this does not amount to an explicit definition of the meaning to be attributed to the term "*stain*" in the patent in suit and, thus, also in claim 1 thereof. Moreover, even such usual definition mentioned in paragraph 5 is very broad, because it embraces any intensively coloured substances that colour fabrics and resist removal by detergents alone. Hence, not even this definition implies that the stains under consideration are only

those normally encountered (on the fabric present) in the final consumer's household.

1.4.2 Reasons justifying a restrictive interpretation of claim 1 can neither be found in paragraph 12, that states that the invention seeks to solve the general problem of removing stains of vegetable origin or of similar structure, and wherein the sole clarifications as to the meaning of "stains" is represented by few non-limiting examples of the stains of structure similar to those of the stains of vegetable origin.

1.4.3 Moreover, in the Board's opinion any restrictive interpretation of the claim would rather be in contradiction with the patent disclosure as a whole.

Indeed, already claim 14, i.e. the other independent claim that defines the cleaning method of the invention (see above section II of the Facts and Submissions), vaguely qualifies the matter to be removed by the cleaning method as "*unwanted residues of vegetal origin*", thereby implicitly confirming that a similarly generic meaning (rather than one limited to the stains normally encountered in the final consumer's household) is also to be attributed to term "stains" in claim 1.

Additionally, paragraph 1 of the patent description states explicitly that the household cleaning applications only represent an especially relevant portion of the broad technical field to which the invention relates (see in paragraph 1 "*The invention relates to the use of enzymes in cleaning applications, **especially** in household cleaning applications...*" emphasis added by the Board). Hence, also this paragraph

implicitly confirms that the invention may also embrace other cleaning uses and methods, beside those aiming at the removal of conventional stains.

1.4.4 Accordingly, the Board sees no justification for restrictively interpreting the wording "*cleaning composition*" and "*stains*" in claim 1 of the patent in suit as referring exclusively to household applications.

1.5 Finally, the patent itself uses the expressions "*cleaning*" and "*washing*" as substantially equivalent (see, for instance, paragraph 50). Hence, the Board finds not convincing the Appellant's attempt to distinguish between the "*cleaning*" method according to the patented invention and the "*washing*" method according to document (2) because of the difference between these terms.

1.6 Thus, the Board concludes that claim 6 of document (2) renders already available to the skilled person the subject-matter of claim 1 of the patent in suit, since the former claim discloses the use of cleaning compositions containing a mannan hemicellulase for removing from textiles some coloured unwanted residues comprising galactomannan plant cell wall components.

1.7 The Board finds therefore that the subject-matter of claim 1 is not novel and, hence, that the ground of opposition under Article 100(a) in combination with article 54 EPC prejudices the maintenance of the European patent as granted.

Hence, the Appellant's main request is not allowable.

*Appellant's auxiliary requests 1 and 2*

2. Inventive step for the subject-matter of claim 1 of each of the auxiliary requests 1 and 2 (Articles 52(1) and 56 EPC).

2.1 The Respondent has objected, *inter alia*, to the patentability of the use of cleaning compositions specifically containing xylanase enzymes as encompassed in claim 1 in each of these requests (see above section VI of the Facts and Submissions) for lack of inventive step. Already the consideration of this objection has brought the Board to the conclusion that none of the auxiliary requests was patentable, for the following reasons.

2.2 As indicated already above (see point 1.4.2) the patent in suit explicitly addresses the technical problem of removing stains of vegetable origin (as well as those of similar structure). Since this definition undisputedly encompasses also the problem of removing the conventional stains of vegetable origin, the Board sees no reason to deviate from the finding of the Opposition Division, agreed by the parties as well, that an appropriate starting point for the inventive step assessment is represented by the common general knowledge as to the household applications of cleaning compositions containing hydrolytic enzymes that is referred to e.g. in document (22).

2.3 Indeed this citation, after recalling at page 25, in the first paragraph of section F, that the removal by detergents of stains, such as grass, is incomplete and

requires the additional presence of a bleach or enzyme, confirms at page 26, lines 4 to 11, the generally known use in cleaning compositions of large classes of enzymes capable of promoting the hydrolytic degradation of their substrates, such as amylases, lipases and, in particular, proteases.

Hence, it is undisputed that the prior art enzyme-containing cleaning compositions comprise hydrolytic enzymes apt at degrading components of the stains to be removed. In other words, as also expressly agreed by the parties at the hearing before the Board, the prior art conventional approach in formulating cleaning compositions containing enzymes was to use therein enzymes able to chemically break down components of the stains to be removed, so as to favour the solubilisation of the dirt.

2.4 The claimed use differs from such prior art only in that the enzyme ingredient of the cleaning composition is a xylanase and in that the stains to be removed comprise components of plant cell walls.

2.5 The Appellant has argued that the experimental data in the patent examples, such as e.g. examples 3 and 5, would prove the superior level of removal of such stains achieved by the claimed use.

2.5.1 The Board notes, however, that the patent as such does not contain any explicit statement that the use of the invention would achieve a cleaning level of stains of vegetable origin that is **superior** to that already achieved by the cleaning compositions of the prior art **containing other sorts of enzymes**.

Nor is the achievement of such superior cleaning level credibly implied by the results of the experimental comparisons given in the patent examples.

On the one hand, the patent examples dealing with the removal of conventional stains of vegetable origin such as grass stains (see e.g. example 5), only compare the invention to cleaning compositions **containing no enzyme** and, thus, only prove that the level of cleaning achieved by the use according to the invention is superior to that achieved in the absence of any enzyme.

On the other hand, the patent examples in which cleaning compositions containing hemicellulases have been tested against comparative compositions based on different enzymes (see e.g. example 3, section 3.6.1), only confirm the predictable superiority of the hemicellulase-containing compositions in removing simplified **artificial stains** made of a dyed hemicellulose material (i.e. containing the specific substrate of the tested hemicellulases onto which the non-hemicellulase hydrolytic enzymes, such as the proteases and amylases used for comparison, can be predicted to exercise no hydrolytic activity). Such artificial stains lack however of the other components (such as water insoluble proteins, starch or fats) normally present in the conventional stains, like grass or food soil, that the claimed use especially aims at removing.

Hence, the examples of the patent in suit do not imply that cleaning compositions based on hemicellulases in general, or specifically on xylanases, achieve a level

of removal of conventional stains of vegetable origin that is superior to that already obtained on the same stains by the conventional enzyme-containing cleaning compositions of the prior art.

2.5.2 Under such circumstances, the Board concludes that, as explicitly stated in paragraph 12 of the patent in suit, the technical problem credibly solved over the whole range by the claimed subject-matter is that of providing a method for removing stains of vegetable origin, i.e. in particular in respect of the conventional stains of vegetable origin, the problem of providing an alternative to the use of the enzyme-containing cleaning compositions of the prior art.

2.6 The Board notes however that the skilled person searching for a solution to the posed problem, is also undisputedly aware that, as already recalled above at point 2.3 of this decision, the enzyme components of the cleaning compositions of the prior art contribute to the removal of stains because of their ability to hydrolyze components of these stains.

Hence, a skilled person would also necessarily expect that, similarly to the (e.g. protease) enzymes that have already been added to the cleaning compositions of the prior art for promoting in general the cleaning of conventional stains, including those of vegetable origin, also any other hydrolytic enzyme manifestly apt at degrading other components of these stains would contribute to their removal.

The Board notes in this respect that hemicellulases in general, and xylanases in particular, rank among the

conventional hydrolytic enzymes that are known to be active on components of many conventional stains. Indeed, as observed by the Respondent with reference to document (18) and undisputed by the Appellant, it is generally known that hemicellulose:

- ranks among the most abundant natural organic chemicals in the biosphere (see document (18), page 93, lines 15 to 10 from the bottom),
- is also largely present not only in plants but also in plant-derived foods (see document (18), page 96, lines 15 to 12 from the bottom) and
- is specifically in the form of xylan e.g. in flour or grass (see document (18), page 93, lines 14 to 12 from the bottom, as well as the line defining the third and fourth formula on page 95), i.e. in the components of some of the most frequent conventional stains.

Hence, a skilled person would have considered hemicellulases in general, and specifically xylanases, suitable for partially or fully replacing the enzymatic components of the conventional cleaning compositions of the prior art, in the reasonable expectation that even after such modification the cleaning compositions would retain their ability to remove at least those many stains of vegetable origin that contain xylylans.

Thus, the Board concurs with the Respondent that the use of xylanase-containing cleaning compositions described in claim 1 of each of the Appellant's auxiliary requests represents an obvious alternative to the prior art.

- 2.7 The Appellant has further maintained that the acidic pH used in the examples of document (2) containing a (modified) hemicellulase (i.e. examples 1 to 6)



demonstrated that xylanases and the other hemicellulases were expected to be active at acidic pH only, i.e. to be insufficiently active under the alkaline conditions normally present in cleaning compositions. Another prejudice against the use of hemicellulases in cleaning compositions would be apparent from the results reported in document (19A) for sample (4) (see the table at page 14) which would suggest a lack of efficacy of cleaning compositions containing hemicellulase as the sole enzyme.

- 2.8 The Board notes initially that the use of acidic pH in the examples of the single patent document (2), all based on mannanase enzymes, is manifestly insufficient for rendering credible the existence of a generally accepted prejudice against the use of hemicellulases in general, or specifically xylanases, in alkaline cleaning compositions. Moreover, as recalled by the Respondent with reference to document (6) (see page 356 last paragraph) and undisputed by the Appellant, alkaliphilic xylanases and other alkaliphilic hemicellulases were also available to the skilled person and had already been investigated for application in the detergent industry. Hence, it appears that whatever prejudice possibly existed for the use of acidic xylanases in cleaning compositions, the same prejudice could not possibly apply to the alkaliphilic enzymes, also embraced by the broad definition of claim 1 in each of the auxiliary requests.

Similarly, the single experimental result observed in sample (4) for a specific hemicellulase in document (19A) is not sufficient for rendering credible the existence of a generally accepted prejudice against the efficacy

of hemicellulases in general, or specifically of xylanases, in cleaning applications. Moreover, the experimental comparisons reported in this citation would at most be relevant in respect of the sort of stains considered therein, such as the muddy dirt used in the experimental comparisons or the grease stains, collar and cuff dirt cited at page 2, lines 10 to 7 from the bottom, of document (19A). As none of these stains seems to contain plant cell wall components, whatever information could be derivable from such citation would not appear *prima facie* relevant for the problem underlying the present invention.

Hence, already for these reasons the Board must conclude that the Appellant has not succeeded in rendering credible the existence of prejudices dissuading the skilled person from considering hemicellulases in general, or specifically xylanases, among the obvious alternatives to the enzymes already present in the conventional cleaning compositions of the prior.

2.9 Thus, the Board concludes that the subject-matter of claim 1 according to the auxiliary request 1 and that of claim 1 according to the auxiliary request 2 do not involve an inventive step. Hence, these claims do not comply with the requirements of Articles 52(1) and 56 EPC and, therefore, none of the auxiliary requests of the Appellant is allowable.

**Order**

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

The appeal is dismissed.

The Registrar:

The Chairman:

G. Rauh

P.-P. Bracke