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**Datasheet for the decision
of 6 October 2020**

Case Number: T 1891/18 - 3.3.06

Application Number: 08870461.4

Publication Number: 2242831

IPC: C11D3/386, C11D3/37

Language of the proceedings: EN

Title of invention:

A laundry detergent composition comprising glycosyl hydrolase

Patent Proprietor:

The Procter & Gamble Company

Opponents:

Henkel AG & Co. KGaA
NOVOZYMES A/S

Headword:

Glycosyl hydrolase and grease cleaning polymer / PROCTER &
GAMBLE

Relevant legal provisions:

EPC Art. 56, 83, 123(2)

Keyword:

Sufficiency of disclosure - (yes)

Inventive step - (yes) : unexpected improvement shown - burden of proof on the respondents/opponents

Decisions cited:

T 0848/04, T 2579/11

Catchword:



Beschwerdekammern

Boards of Appeal

Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 1891/18 - 3.3.06

D E C I S I O N
of Technical Board of Appeal 3.3.06
of 6 October 2020

Appellant: The Procter & Gamble Company
(Patent Proprietor) One Procter & Gamble Plaza
Cincinnati, OH 45202 (US)

Representative: Russell, Tim
Venner Shipley LLP
200 Aldersgate
London EC1A 4HD (GB)

Respondent 1: Henkel AG & Co. KGaA
(Opponent 1) Henkelstrasse 67
40589 Düsseldorf (DE)

Representative: Henkel AG & Co. KGaA
CLI (Patente)
40191 Düsseldorf (DE)

Respondent 2: NOVOZYMES A/S
(Opponent 2) Krogshøjvej 36
2880 Bagsvaerd (DK)

Representative: Potter Clarkson
The Belgrave Centre
Talbot Street
Nottingham NG1 5GG (GB)

Decision under appeal: **Interlocutory decision of the Opposition
Division of the European Patent Office posted on
15 May 2018 maintaining European Patent No.
2242831 in amended form.**

Composition of the Board:

Chairman J.-M. Schwaller
Members: L. Li Voti
 C. Heath

Summary of Facts and Submissions

- I. The appeal of the patent proprietor (the appellant) is against the decision of the Opposition Division to maintain European patent n° 2 242 831 in amended form on the basis of auxiliary request 9 filed during oral proceedings on 19 April 2018.
- II. With its statement of grounds the appellant defended the patent as granted. Moreover it filed three sets of amended claims as auxiliary requests 1 to 3.
- III. In their replies the two opponents (the respondents) raised objections under articles 123(2), 54, 56 and 83 EPC. In particular, they maintained that the claimed subject-matter lacked inventive step over the combination of document **D15** (EP 1 065 259 A1) with document **D5** (WO 01/062903 A1) alone or in combination with **D18** (Appendix 1, Supplementary results dated 30 June 2005 and filed in case EP 01 905 635.7).
- IV. The following documents were also referred to inter alia by the parties:
- D33**: Declaration of Lars Anderson dated 9 November 2016
- D35**: Declaration of Bernard Henrissat dated 7 November 2016
- D37**: Technical report and submissions of P&G during examination proceedings, dated 10 September 2010
- D39**: A. Ariza et al., "*Structure and Activity of Paenibacillus polymyxa Xyloglucanase from Glycoside Hydrolase Family 44*", JOURNAL OF BIOLOGICAL CHEMISTRY, (2011) 286, 39, 33890-33900

D43: B. Henrissat, "*A classification of glycosyl hydrolases based on amino acid sequence similarities*", Biochem. J. (1991) 280, 309-316

D44: Excerpts from <http://www.cazy.org>, 06.02.2019, relating to glycosyl hydrolases families 5, 12, 44 and 74.

V. Following the board's preliminary opinion, respondent 1 declared not willing to attend the oral proceedings but maintained its request to dismiss the appeal. Further it requested that auxiliary request 2 not be admitted into the proceedings.

VI. During the oral proceedings, which were held in the absence of both respondents, the appellant withdrew its main request and auxiliary requests 1 and 2.

VII. The final requests of the parties were as follows:

The Appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of auxiliary request 3 filed with letter dated 25 September 2018.

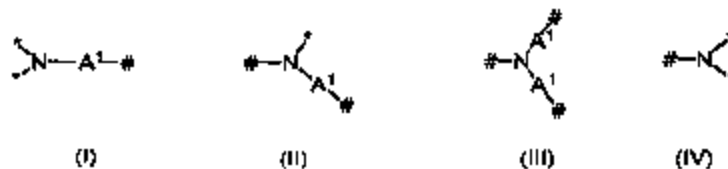
Both respondents requested in writing that the appeal be dismissed.

VIII. Claim 1 of auxiliary request 3 reads as follows:

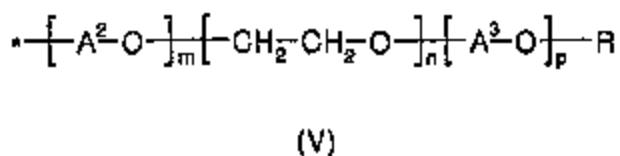
*"1. A laundry detergent composition comprising:
(i) a glycosyl hydrolase having enzymatic activity towards both xyloglucan and amorphous cellulose substrates, wherein the glycosyl hydrolase enzyme belongs to glycosyl hydrolase family 44;
and*

(ii) amphiphilic alkoxyated grease cleaning polymer having:

a core structure comprising a polyalkylenimine structure comprising, in condensed form, repeating units of formulae (I), (II), (III) and (IV):



wherein # in each case denotes one-half of a bond between a nitrogen atom and the free binding position of a group A¹ of two adjacent repeating units of formulae (I), (II), (III) or (IV); * in each case denotes one-half of a bond to one of the alkoxyate groups; and A¹ is independently selected from linear or branched C₂-C₆-alkylene; wherein the polyalkylenimine structure consists of 1 repeating unit of formula (I), x repeating units of formula (II), y repeating units of formula (III) and y+1 repeating units of formula (IV), wherein x and y in each case have a value in the range of from 0 to 150; where the weight average molecular weight, Mw, of the polyalkylenimine core structure is a value in the range of from 60 to 10,000 g/mol; wherein the plurality of alkylenoxy groups attached to the core structure are independently selected from alkylenoxy units of the formula (V)



wherein * in each case denotes one-half of a bond to the nitrogen atom of the repeating unit of formula (I), (II) or (IV); A² is in each case independently selected from 1,2-propylene, 1,2-butylene and 1,2-isobutylene; A³ is 1,2-propylene; R is in each case independently selected from hydrogen and C₁-C₄-alkyl; m has an

average value in the range of from 0 to about 2; n has an average value in the range of from about 20 to about 50; and p has an average value in the range of from about 10 to about 50; and

(iii) *detersive surfactant.*"

Dependent claims 2 to 8 relate to particular embodiments of the composition of claim 1 and claim 9 relates to a method of laundering including the step of contacting a liquid composition according to claims 1-8 with water to form a wash liquor.

Reasons for the Decision

1. *Sufficiency of disclosure (Article 83 EPC)*
 - 1.1 Respondent 2 having raised this issue without however replying to the provisional opinion, the board does not see any reason to depart therefrom.
 - 1.2 In particular the description of the patent (page 5, lines 52-53 and examples) and the corresponding passages of the application as filed clearly identify glycerol hydrolase enzyme(s) (in the following **GH(s)**) which comply with the requirements of claim 1 at issue, namely GHs from *Paenibacillus polyxyrna* (wild-type) such as XYG1006 described in WO 01/062903 or variants thereof and the XYG1006 enzyme according to SEQ ID: 1.
 - 1.3 Moreover the skilled person was able at the priority date of the patent to determine whether or not an enzyme was active towards one or more specific substrates. This is confirmed by the cited prior art, for example document **D4** (WO 99/02663 A1), which illustrates (page 3, lines 1-32) known GHs having both

activities towards xyloglucan and amorphous cellulose. Further it is to be noted that the class of GHs belonging to family 44 and having enzymatic activity towards xyloglucan and amorphous cellulose is very limited (see *infra*).

1.4 Therefore the skilled person, by following the teaching of the description and using common general knowledge, was able to prepare a laundry detergent composition comprising the required GH, the amphiphilic alkoxyated grease cleaning polymer and the deterative surfactant of claim 1, which both are also very common components. Even though the examples of the patent concern only one GH falling under the wording of claim 1 at issue, the skilled person was thus also able to find without undue burden other GHs belonging to family 44 and having the required activities.

1.5 The board therefore concludes that the disclosure in the patent in suit allows the person skilled in the art to carry out the invention in the whole range claimed and therefore complies with the requirements indicated in established jurisprudence (see Case Law of the Boards of Appeal of the EPO, 9th edition 2019, II.C. 5.2-5.4, pages 355-358 and II.C.7.1.2, pages 372-373).

1.6 It follows that the ground under Article 100(b)/83 EPC does not prejudice the maintenance of the patent.

2. *Added matter (Article 123(2) EPC) and novelty (Article 54 EPC)*

The respondents having not substantiated any specific objection under these Articles, the board has no reason to depart from its preliminary opinion that the claims of auxiliary request 3 comply with the requirements of

article 123(2) EPC and are novel over the cited prior art.

3. *Inventive step (Article 56 EPC)*

3.1 The claimed invention concerns a laundry detergent composition comprising i) a glycosyl hydrolase belonging to family 44 and having enzymatic activity towards both xyloglucan and amorphous cellulose substrates, ii) a specified amphiphilic alkoxyated grease cleaning polymer having a polyalkylenimine core structure and iii) deterative surfactants.

3.2 The purpose of the patent in suit (paragraphs [0001], [0004], [0007] and [0008]) is the provision of a compacted laundry detergent composition which though containing a minor amount of surfactants does not suffer from a loss in fabric cleaning performance and shows a significant improvement in cotton soil release profile, whiteness maintenance profile and dingy cleaning performance.

3.3 It was common ground among the parties that document D15 was the starting point for evaluating inventive step. In particular, its example 9 (formulations II, IV and V) was held to represent the closest prior art. Since the compositions in D15, paragraphs [0013] and [0061], comprise surfactant levels similar to those disclosed in the patent in suit and provide excellent whiteness maintenance and dingy cleaning, the board has no reason to take a different stance.

3.4 It is not in dispute that the closest prior art (D15/ example 9) differs from the subject-matter of claim 1 at issue only in that it does not comprise a family 44

GH having enzymatic activity towards both xyloglucan and amorphous cellulose substrates.

- 3.5 The appellant submitted that the technical problem underlying the invention starting from this closest prior art was to provide a laundry detergent composition showing unexpected improved whiteness performance.
- 3.5.1 The board notes that document D37 reports whiteness performance values measured on white cotton fabrics soiled with carbon black and vegetable oils and washed with a laundry detergent composition. The results show that a laundry detergent composition comprising a combination of a variant of the GH enzyme XYG 1006 belonging to family 44 with the polymer of claim 1 provides at least on flat cotton a significant higher whiteness performance than similar compositions comprising the same amounts of either the GH enzyme or the polymer. Moreover, this report shows that doubling the amounts of enzyme or polymer does not lead to any significant further improvement in whiteness performance.
- 3.5.2 Respondent 2 objected that the used GH enzyme is not characterised in detail in D37 and that it could not be derived therefrom that it is a GH enzyme according to claim 1. Therefore the results in D37 should be disregarded, as decided in case **T 2579/11** (reasons, points 2.5.1 and 2.5.2, and Case Law of the Boards of Appeal of the EPO, 9th edition 2019, I.D.4.1, page 189).

The board cannot accept this argument since the enzyme used is clearly stated in D37 to be a variant of the XYG1006 enzyme disclosed in US 2004/0266642 (of **GH**

family 44), thus corresponding to the enzyme class described in the patent (page 5, lines 52-53) as "GH family 44 glycosyl hydrolases from *Paenibacillus polyxyma* (wild-type) such as **XYG1006** are described in WO01/062903 **or are variants thereof**". Moreover the patent proprietor confirmed at the oral proceedings before the opposition division that the used GH was **Whitezyme** supplied by Novozymes, i.e. an enzyme according to claim 1 at issue. This statement was also accepted in the decision under appeal. The burden of proof that the GH enzyme used in D37 is not one according to claim 1 at issue is thus clearly on the respondent. In the absence of evidence to the contrary the board has no reason to believe that the GH enzyme used in D37 is not in accordance with claim 1 at issue and the board thus does not agree that the test results of D37 are not verifiable and should be disregarded.

3.5.3 Furthermore, even though D37 concerns only a single GH enzyme according to claim 1, the experimental report confirms what is already stated in the patent in suit (paragraph [0008]) and the corresponding part of the original application, namely that the combination of these enzymes with the chosen polymer provides significant improvement in whiteness performance. Therefore, even though the application as filed did not comprise any comparative tests supporting the efficiency of the claimed combination, this report confirms the original teaching and is thus to be accepted and considered (Case Law of the Boards of Appeal of the EPO, 9th edition 2019, I.D.4.6, pages 195-197).

3.5.4 Respondent 1, referring to D35 or D43, argued that other enzymes belonging to the family GH 44, though having similar specific structural characteristics and

amino acid sequences might have a different level of activity, with the consequence that similar improvements in whiteness might not be obtained.

The board however observes that even though the GH family 44 of claim 1 at issue includes a growing number of enzymes, some of them being still unknown or not classified at the priority date of the patent, as shown by comparing the relevant excerpts from <http://www.cazy.org> contained in D33 and D44, the claim at issue does not include all GH enzymes belonging to said family 44 but is definitely limited to those GH enzymes belonging to family 44 which have enzymatic activity towards **both** xyloglucan and amorphous cellulose.

Also the postpublished article D39, disclosing the structure and activity of the GH family 44 enzymes from *Paenibacillus polyxima*, i.e. those used in the examples of the patent in suit and tested in D37, states (page 33890, left column, last paragraph; page 33891, left column, lines 13-19 below figure 1; and page 33893, right column, first paragraph below heading "RESULTS AND DISCUSSION") that **only two** enzyme structures of the family 44 GH reported so far had been found to be "bifunctional glucanase-xylanases" and that the enzyme from *Paenibacillus polyxima* discussed in the article has an atypical specificity against xyloglucan and amorphous cellulose.

Therefore, the class of enzymes of claim 1 at issue having specificity against xyloglucan and amorphous cellulose includes definitely only a very limited number of GHs.

For the board, contrary to what is stated in the decision under appeal, it is thus plausible, in the

absence of contrary evidence, that the effect shown in D37 is to be expected in this particular case by using also other GH enzymes falling under the wording of claim 1 at issue.

- 3.5.5 Even though the experimental report D37 does not provide a comparison with respect to a composition of the closest prior art, the board finds credible that the incorporation of a GH enzyme according to claim 1 into the compositions of the closest prior art would provide a similar significant improvement in whiteness, since the compositions of the closest prior art already contains a polymer similar to that used in D37.

Decision **T 848/04**, cited by the respondents, concerned a case in which the achievement of a synergistic effect between a lipase and an amine was obtained by using specific ratios of the two components (points 2.6-2.8 of the reasons); the present case however concerns an improved effect obtained by the addition of the GH enzyme of claim 1 at issue to the composition of the closest prior art. The above cited decision is thus not relevant to the present case.

- 3.5.6 Respondent 1 also objected that the requested patent monopoly was not justified by the actual contribution to the art. However, since the patent already teaches that the combination of specific GH family 44 enzymes with a polymer provides benefits in terms of significant whiteness improvement and since the range of GH family 44 enzymes having the required dual activity is very limited, the board cannot accept this argument either.

- 3.5.7 Furthermore the burden of proof to show that such a significant whiteness improvement has not been credibly

obtained throughout the entire breadth of claim 1 lying in this case on the side of the respondents/opponents (see Case Law of the Boards of Appeal of the EPO, 9th edition 2019, point 5.2.1, pages 775-776), it cannot simply be shifted to the appellant/patent proprietor, as decided by the opposition division.

- 3.5.8 Since the respondents did not provide any evidence in this respect they have not discharged their burden of proof that the technical problem of providing an unexpected improved whiteness performance was not solved over the entire breadth of the claimed subject-matter.
- 3.5.9 The board thus agrees with the appellant that the technical problem underlying the invention is to be formulated as the provision of a further laundry detergent composition providing an unexpected improvement in whiteness performance and that the technical problem posed has been convincingly solved by the laundry detergent composition of claim 1.
- 3.6 It remains thus to be evaluated if it was obvious for the skilled person to incorporate a GH family 44 enzyme having activity towards xyloglucan and amorphous cellulose into a composition of the closest prior art with the expectation of providing a composition showing a significant increase in whiteness performance.
- 3.6.1 The board notes in this respect that D15 suggests (paragraph [0068]) that further enzymes, such as xyloglucanases, can be added to the disclosed compositions; however, it does not contain any teaching that would have led the skilled person to try the specific glycosyl hydrolase of family 44, as presently defined in claim 1 at issue, in order to improve

significantly whiteness. Yet, D15 (paragraphs [0008], [0009] and [0013]) clearly teaches that excellent cleaning results are obtained by using an amyloglucosidase and possibly other amylase enzymes as essential components.

Therefore the skilled person faced with the technical problem posed would have rather followed the teaching of D15 and looked for a particularly efficient amyloglucosidase or amylase but not for a particular efficient xyloglucanase.

Therefore, the skilled person would not have found in D15 any incitation to incorporate a xyloglucanase in the compositions of example 9 with the expectation of significantly improving whiteness.

- 3.6.2 As regards D5, it is true that this document discloses (see page 3, lines 22-26; page 5, lines 18-22) xyloglucanases complying with the requirements for the GHs of claim 1 at issue, like XYG1006 (see example 3) as well as detergent compositions comprising such an enzyme (example 4) and showing excellent performance especially for removing or bleaching specific soils resulting from xyloglucan-containing food or plants.

However, even though the skilled person could have tried to incorporate such an enzyme in a laundry detergent composition of D15 because of its known xyloglucanase activity, he would not have done so with the expectation of obtaining a significant improvement in whiteness performance because there is no hint pointing into this direction.

The board is therefore convinced that a skilled person starting from D15 would have considered the enzymes of

document D5 as a possible solution to the posed technical problem only with previous knowledge of the claimed invention, i.e. retrospectively.

- 3.6.3 As regards D18, this experimental report contains some comparative tests including a comparison of the enzyme XYG 1006 (according to claim 1 at issue) with Endolase[®], which is a GH and one of the cellulases possibly used according to the closest prior art, in the absence of the polymer of claim 1 at issue.

The board notes that D18 explicitly indicates (first paragraph below heading "Iron-oxide post-staining") that **post-staining was required** for visualising the xyloglucanase effect (i.e. the effect of XYG1006) since **the difference in whiteness** after washing was **too low** (only about 1 unit was measured). For the board this means that D18 actually shows that under normal washing conditions **no significant improvement of the whiteness** is obtained just by replacing one of the cellulases used in the closest prior art with a GH enzyme according to claim 1 at issue. D18 thus does not provide any hint that the GH of claim 1 would provide significant improved whiteness as shown in D37 when added to a composition comprising an amphiphilic alkoxyated grease cleaning polymer of claim 1 like those of the closest prior art.

Therefore also here the skilled person would have considered D18 only with previous knowledge of the claimed invention, i.e. retrospectively.

- 3.7 The board therefore concludes that the subject-matter of claim 1 (and of claims 2 to 9 which depend thereon) involves an inventive step and that the ground under

Article 100(a) and 56 EPC does not prejudice the maintenance of the patent in amended form.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance with the order to maintain the patent on the basis of claims 1-9 according to Auxiliary Request 3 as filed with letter dated 25 September 2018, and a description to be adapted thereto.

The Registrar:

The Chairman:



A. Pinna

J.-M. Schwaller

Decision electronically authenticated