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D E C I S I O N
of 7 June 2002

Case Number: T 0502/98 - 3.3.6

Application Number: 89120891.0

Publication Number: 0368341

IPC: C11D 3/386

Language of the proceedings: EN

Title of invention:
Enzymatic detergent composition

Patentee:
KAO CORPORATION

Opponent:
PROCTER & GAMBLE EUROPEAN TECHNICAL CENTER N.V.

Headword:
Detergent composition/KAO

Relevant legal provisions:
EPC Art. 114(2), 56

Keyword:
"Documents promptly filed in reaction to unforeseeable
amendments of the claims - late filed (no)"
"Inventive step (yes) - nonobvious combination"

Decisions cited:
T 0715/95; T 0238/92; T 0532/95; T 0389/95; T 0201/92

Catchword:
-



Case Number: T 0502/98 - 3.3.6

D E C I S I O N
of the Technical Board of Appeal 3.3.6
of 7 June 2002

Appellant: PROCTER & GAMBLE EUROPEAN TECHNICAL CENTER N.V.
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Respondent: KAO CORPORATION
(Proprietor of the patent) 14-10, Nihonbashi Kayaba-cho, 1-chome
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Tokyo (JP)

Representative: Hansen, Bernd, Dr. Dipl.-Chem.
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Decision under appeal: Interlocutory decision of the Opposition Division
of the European Patent Office posted 14 April
1998 concerning maintenance of European patent
No. 0 368 341 in amended form.

Composition of the Board:

Chairman: P. Krasa
Members: P. Ammendola
M. B. Tardo-Dino

Summary of Facts and Submissions

- I. This appeal is from the interlocutory decision of the Opposition Division concerning the maintenance in amended form of European patent No. 0 368 341 relating to a detergent composition containing starch debranching enzymes.
- II. The Appellant (Opponent) sought revocation of the patent in its entirety on the grounds of lack of novelty and inventive step (see Article 100 (a) EPC in conjunction with Articles 54 and 56 EPC).

In preparation for the oral proceedings before the Opposition Division, scheduled for 11 March 1998, the Respondent (Patent Proprietor) filed under cover of a letter dated 11 February 1998 amended claims and new experimental data.

During the opposition proceedings the following documents were cited, among others, by the parties:

- Document (2) GB-A-1 293 613
- Document (3) Novo's Handbook of Practical
Biotechnology, 2nd edition (1986), 70-76
- Document (3') Novo's Handbook of Practical
Biotechnology, 2nd edition (1986), 103
- Document (4) WO 86/01831 (= EP-A-0 195 068)
- Document (5) M. Nakamura "Amylase, An Approach to
Bioengineering", 301-303 and English
translation thereof

- Document (6) Römpps Chemie-Lexikon, 8th Ed. Vol. 5.
(1987), 3945-3947 "Stärke"
- Document (7) T. Godfrey and J. Reichelt, "Industrial
Enzymology" (1983), 182-185,
375-376, 476
- Document (8) Whistler et al. "Carbohydrate Chemistry
for Food Scientists", (1997), 120
- Document (9) Römpps Chemie-Lexikon, 8th Ed. Vol. 1,
(1979), 198 "Amylopektin" "Amylose"
- Document (10) Preliminary Product Information by Novo
Industri A/S "PROMOZYME 200L" 1983
- Document (11) "Dictionary of Detergent and Washing"
(1990), 28-29 and partial English
translation of page 28
- Document (12) EP-A-0 158 435
- Document (15) Product Sheet Novo Industri A/S
"PROMOZYME" 1987

Documents (3'), (10), (12) and (15) were filed by the Appellant for the first time at the oral proceedings before the Opposition Division, which decided to admit Documents (3'), (10) and (15) to the proceedings but not Document (12).

III. In its decision the Opposition Division found that the subject-matter of the claims according to the Respondent's main request as modified during the oral proceedings was novel and based on an inventive step

vis-à-vis the relevant state of the art in particular as disclosed in Document (2).

- IV. The Appellant filed an appeal against this decision and requested revocation of the patent, presenting exclusively arguments with respect to lack of inventive step.

The Appellant also requested the introduction into the proceedings of the above-mentioned Document (12) as well as of the following two new citations:

Document (13) Derwent Abstract of JP-A-63 036 780

Document (14) Derwent Abstract of JP-A-62 006 696

- V. The Respondent objected to the introduction of the late filed Documents (12) to (14) and requested in the letter of 7 May 2002 that the patent be maintained in amended form on the basis of the set of claims labelled "main request" or, alternatively, on the basis of the sets of claims labelled "auxiliary request" I to VII also filed under cover of the same letter.

The three independent claims 1, 9 and 17 according to the main request read as follows:

- "1. *An automatic-dishwashing detergent composition comprising at least one surfactant, which is characterized in that it contains at least one starch debranching enzyme selected from the group consisting of pullulanase and isoamylase, and containing at least one inorganic alkaline substance in an amount so that the washing solution, when it contains the detergent*

composition in a concentration of 0,05 to 1% by weight, has a pH of 9,0 to 11,0."

"9. *A laundering detergent composition comprising at least one surfactant, which is characterized in that it contains at least one starch debranching enzyme selected from the group consisting of pullulanase and isoamylase, and that it contains at least one inorganic alkaline substance in an amount so that the washing solution, when it contains the detergent composition in a concentration of 0,05 to 1% by weight, has a pH of 9,0 to 11,0."*

"17. *Use of a composition comprising at least one surfactant and at least one starch debranching enzyme selected from the group consisting of pullulanase and isoamylase as an automatic-dishwashing detergent or a laundering detergent, wherein the composition contains at least one inorganic alkaline substance in an amount so that the washing solution, when it contains the detergent composition in a concentration of 0,05 to 1% by weight, has a pH of 9,0 to 11,0."*

VI. Oral proceedings were held before the Board on 7 June 2002.

During the oral proceedings the Respondent adapted the patent specification to the claims of the main request by filing amended pages 2, 3, 5 and 17.

The Appellant did not raise any objection under the provisions of Articles 84, 123(2) and (3) EPC with

respect to the amended claims according to the Respondent's main request nor did it contest the novelty of their subject-matter.

The Appellant also had the opportunity to comment on the amendments to the description made during the oral proceedings by the Respondent, and did not raise any objection.

VII. The Appellant maintained in writing and orally that the filing of Documents (12) to (14) at a late stage of the proceedings was due to the fact that only one month before the hearing in the opposition proceedings the Respondent had incorporated into the independent claims a feature previously disclosed only in the description of the opposed patent.

The arguments presented orally and in writing by the Appellant in respect of the absence of an inventive step for the subject-matter of the disputed patent can be summarised as follows:

- Document (2) represented the most relevant state of the art;
- in the absence of convincing experimental evidence showing that the claimed detergent compositions had improved properties with respect to those of Document (2), the only technical problem credibly solved by the presently claimed detergent compositions was that of providing an alternative to the detergent composition of Document (2) containing amylolytic enzymes;
- this problem was solved in the disputed patent

simply by substituting the amylolytic enzyme explicitly disclosed in Document (2) by other enzymes with starch debranching activity such as the well-known pullulanase and isoamylase.

Moreover, the Appellant maintained that the person skilled in the art was aware that surfactants showed maximised detergency at alkaline pH and, therefore, that it was obvious to search for starch debranching enzymes active at the same alkaline pH value at which the surfactant activity was maximised. In the Appellant's opinion, the skilled reader was able to derive from the available state of the art that pullulanases provided a substantial starch debranching activity also during dishwashing or laundering at an alkaline pH of 9 or more.

VIII. The Respondent argued that Documents (12) to (14) were late filed and not more relevant than the other documents already cited.

It agreed that Document (2) represented the most relevant state of the art. In its opinion, however, Document (2) disclosed only in general the pH range with the maximum value of 9, i.e. such value was described in connection with all the enzyme-containing compositions referred to therein.

The Respondent admitted that none of the comparative examples provided in the patent in suit was actually representative of the disclosure of Document (2). However, it maintained that the technical problem solved by the opposed patent with respect to the relevant state of the art was to provide detergent compositions for automatic dishwashing or for laundry

washing with an improved starchy soils removal.

The Respondent argued that it was **not** possible in view of the cited documents to foresee either that pullulanases would show an improved starchy soil removal in washing processes at an alkaline pH far away from the "optimum" pH ranges for enzymatic activity, or that amylolytic enzyme-containing detergent compositions produced better washing results at alkaline pH than similar detergents based only on α -amylases.

The Respondent stressed that none of the cited documents describing pullulanase or isoamylase belonged to the technical field of detergents.

- IX. The Appellant requested that the decision under appeal be set aside and that the European patent No. 368 341 be revoked.

The Respondent requested that the patent be maintained with claims 1 to 17, pages 2, 3, 5 and 17, filed during oral proceedings and pages 4 and 5 to 16 of the patent as published (main request) or, alternatively, on the basis of the claims of the auxiliary requests I to VII, all requests submitted under cover of the letter of 7 May 2002.

Reasons for the Decision

Procedural issues

1. *Documents (12) to (14)*

- 1.1 Document (12) was filed by the Appellant at the hearing before the Opposition Division and re-filed with the grounds of appeal.

Documents (13) and (14) were filed for the first time with the grounds of appeal.

The Opposition Division considered Document (12) late filed and no more relevant than the other already available evidence and decided under the provisions of Article 114(2) EPC not to admit it into the proceedings.

- 1.2 The Appellant maintained that these documents were submitted in reaction to amendments filed by the Respondent on 11 February 1998 (i.e. one month before the hearing in the opposition proceedings), whereby the claimed detergents had been additionally characterized by the further feature that they must contain sufficient alkaline substance to produce a washing liquor with a pH of 9 to 11.

It submitted that Documents (12) to (14) could **not** have been filed at an earlier stage, since one could not foresee the incorporation into claim 1 of an additional feature which was not mentioned in any of the patent claims as granted, but had been disclosed only in the patent specification.

- 1.3 The Respondent maintained that Documents (12) to (14) were to be disregarded since the Appellant should have filed them at an earlier stage. It submitted that the written communications of the Respondent and of the Opposition Division preceding the submissions dated 11 February 1998, would have already rendered apparent

that the pH range in the washing liquor would become important in the assessment of inventive step.

- 1.4 The Board observes that the discretionary power of the Opposition Division or of the Board of Appeal under Article 114(2) EPC is only applicable to the factual situation in which facts or evidence have not been filed in due time.

Therefore, an Opposition Division or a Board of Appeal confronted with the filing of facts or evidence must necessarily first establish whether or not they have been filed in due time.

- 1.5 According to the case-law of the Boards of Appeal, not only the facts and the evidence submitted by the opponent within the nine-month period to file an opposition and those possibly submitted by the patent proprietor within the four months given for replying to the grounds of oppositions are "filed in due time".

The filing of facts and evidence within subsequent periods of time may also be in "due time" when it occurs in accordance with the principle of procedural economy and, therefore, when the filing party has observed a fair degree of procedural vigilance (see e.g. the unpublished decisions T 201/92 of 18 July 1995, points 3.5 and 3.6 of the reasons, T 238/92 of 13 May 1993, point 2.2 of the reasons, T 532/95 of 4 March 1995, point 2.2 of the reasons and T 389/95 of 15 October 1997, point 2.2 of the reasons).

This may occur, for instance, when certain facts or evidence become relevant only after a party has submitted an unforeseeable amendment of the claims or a

new experimental test report or has challenged for the first time the existence of common general knowledge undisputed up to that moment.

In such cases, a diligent party normally has no reason, let alone obligation, to search for, retrieve and file such facts and evidence before such action of the other party and, therefore, the prompt filing thereof within the phases of the proceedings immediately subsequent to the moment at which their relevance become apparent has been considered as occurring in due time (see the jurisprudence of the Boards of Appeal cited above).

- 1.6 In the present case the Board notes that Documents (12) to (14) provide information as to the activity of starch-debranching enzymes at alkaline pH, i.e. information relating to the feature additionally introduced for the first time into the amended claims filed on 11 February 1998. This fact supports the Appellant's statement that the filing of these documents was caused by the Respondent filing these amended claims.

Additionally, the Board agrees with the Appellant that the discussion in the communication of the Opposition Division expressed only a provisional opinion (see at the end of page 2 "...is presently of the opinion..."), and nothing in the Respondent's subsequent written submissions implied that the aspects of the invention which had been discussed were going to be reflected in limiting features incorporated in amended claims. Therefore, the Board finds that the Appellant could not foresee before the filing of such amended claims that the Respondent would actually limit the claimed matter by defining the pH of the washing liquor produced.

After the Respondent's filing in the European Patent Office of the amended claims and of the new experimental data only one month was left until the oral proceedings took place before the Opposition Division (see above point II). Taking into account that notifying the Appellant of the Respondent's submission required additional time, only less than one month was available to the Appellant to prepare an appropriate reaction at the said oral proceedings.

Under the circumstances of this case, the Appellant could not reasonably be expected to file Document (12) earlier.

Thus the Board comes to the conclusion that Document (12) was not filed late but in due time.

1.7 Accordingly, the Opposition Division was wrong in exercising in respect of Document (12) its discretionary power pursuant Article 114(2), which only applies to facts and evidence filed late.

1.8 Under the circumstances of this case it is not evident either that the Appellant was in the position or was to be expected or obliged to retrieve and submit Documents (13) and (14) at the latest on the day of the oral proceedings before the Opposition Division.

It follows that submitting these two documents with the Grounds of Appeal was not late but also in due time.

1.9 The Board thus concludes that Documents (12) to (14) must be taken into consideration in the appeal proceedings.

Respondent's main request

2. *Novelty (Articles 52(1) and 54 EPC) and the requirements of Articles 84, 123(2) and (3) EPC.*

The Board is satisfied that the subject-matter of the amended claims of the main request is novel (Articles 52(1) and 54 EPC) and that the amended claims and the description adapted thereto of the main request also comply with the requirements of Articles 84, 123(2) and (3) EPC and.

It is not necessary to give further details, since no objections were raised by the Appellant in this regard during the appeal proceedings.

3. *Inventive step concerning the subject-matter of claims 1 and 9*

Independent claims 1 and 9 define an automatic-dish-washing composition and a laundering detergent composition, respectively. The reasoning as to the presence of an inventive step for these two different detergent compositions is, however, substantially identical and therefore will be discussed jointly in the following paragraphs.

- 3.1 The disputed patent relates to automatic dish-washing and laundering detergent compositions containing starch debranching enzymes.

The technical problem explicitly addressed in the disputed patent is that of improving starchy dirt detergency in automatic dish-washing (see page 2, lines 28 to 30, page 6, lines 9 to 12, and Examples 1,

3 and 5 of the published patent).

It can also be deduced from the patent in suit that the laundering compositions disclosed therein were intended to provide an improved starchy dirt removal (compare the above identified passages related to automatic dish-washing to claims 9 and 17 in combination with Examples 2 and 4).

- 3.2 The only document on file disclosing enzyme-containing detergent compositions is Document (2).

It describes amylolytic enzyme-containing detergents, preferably with a pH from 4 to 9, suitable for removing starchy dirt in laundering and dish-washing (see claims 1, 4 and 24 in combination with page 1, lines 25 to 30 and 77 to 79, page 2, lines 3 to 5 and page 4, lines 34 to 50). Therefore, the Board agrees with the parties that Document (2) represents an appropriate starting point for the evaluation of inventive step.

- 3.3 The Appellant maintained that the compositions of the patent in suit differed from those disclosed in Document (2) exclusively in that they contained different amylolytic enzymes.

Since Document (2) does not disclose explicitly amylolytic enzyme-containing detergent compositions with a pH of 9, the Appellant's statement suggests that the end value of 9 for the preferred pH range defined in this document is **implicitly** disclosed in combination with the compositions containing amylolytic enzymes.

However, the Board finds that the definition of the pH range from 4 to 9 in Document (2) has not been

disclosed **specifically** for the detergent compositions containing amylolytic enzymes, but in general for all compositions claimed in this document and containing amylolytic, lipolytic and/or proteolytic enzymes.

On the other hand, the large number and the variable nature of all enzymes belonging to these three classes do not render plausible a **general applicability** of this pH range to each detergent composition of Document (2) and, therefore, also to the compositions comprising amylolytic enzymes.

Therefore, the pH range of 4 to 9 has not been implicitly disclosed in Document (2) in connection with compositions comprising amylolytic enzyme.

Thus the Board concludes that the detergent compositions according to the claims of the Respondent's main request differ from those disclosed in Document (2) in that they contain pullulanase or isoamylase **and** an amount of alkaline substances which produce a pH of 9 to 11 in the washing solution.

- 3.4 As conceded by the Respondent during the hearing before the Board, **none** of the available comparative examples matches the disclosure of Document (2). In particular, all the comparative examples provided, containing α -amylases as the only enzyme, were carried out in washing solutions with a pH well above 9.

The Respondent has stressed that the further comparisons provided by the Appellant as well as by the Respondent during the appeal proceedings (see page 13 of the grounds of appeal and page 4 of the Respondent's letter of 1 March 1999) demonstrated an improved

starchy dirt removal by the claimed compositions as compared with compositions containing no enzyme at all.

However, the compositions disclosed in Document (2) also produced better removal of starchy soil than the corresponding enzyme-free detergents (compare in the table on page 5 the reflectance values for cocoa stains of samples B to D vs. that of sample A).

Therefore, in the absence of any convincing evidence that the claimed compositions actually display a starchy dirt removal superior to those of the compositions according to Document (2), the technical problem addressed in the disputed patent (see point 3.1 above) cannot be considered as having been solved by the claimed subject-matter.

- 3.5 However, in view of the fact that the compositions claimed in the patent in suit as well as those disclosed in Document (2) display a better removal of starchy soils than the corresponding enzyme-free detergents (see in point 3.3 above) the Board concludes that both enzyme-containing compositions are comparatively satisfactory for the final user.

It follows that the technical problem which can be considered as actually solved by the subject-matter of claims 1 and 9 of the Respondent's main request vis-à-vis Document (2) is that of providing further detergent compositions, alternative to those of Document (2) producing satisfactory starchy soil removal.

- 3.6 The Appellant's reasoning as to the lack of inventive step for the subject-matter of claims 1 and 9 of the Respondent's main request was as follows.

3.6.1 Document (2) explicitly considers two starch debranching enzymes and, as is evident from Documents (3), and (5) to (9), starch debranching enzymes are capable of rendering linear the branched amylopectin (which is the most abundant, insoluble and gel-forming component of starch), i.e. capable of rendering amylopectin similar to the water-soluble amylose.

Therefore, in the Appellant's opinion, the person skilled in the art considered the starch debranching enzymes such as pullulanases and isoamylases cited in Documents (3) to (10) and (12) to (15) as representing the most promising alternative to the amylolytic enzymes specifically disclosed in Document (2) in order to obtain satisfactory starchy dirt removal.

Accordingly, so the Appellant argued, it was obvious for the person skilled in the art to solve the existing technical problem by preparing detergent compositions containing pullulanases and/or isoamylases instead of the other amylolytic enzymes disclosed in Document (2).

3.6.2 Moreover, the Appellant underlined that for "ages" the person skilled in the art has been aware that laundering compositions provide the best removal of soils at alkaline pH, particularly at a pH of 9 to 11.

Accordingly, the skilled person would also have expected that the detergent compositions containing starch debranching enzymes produced more likely the desired removal of starchy dirt if the washing liquor produced had an alkaline pH of 9 to 11.

3.6.3 Therefore, the skilled person would have searched in

particular for starch-debranching enzymes suitable for working at such pH of 9 to 11 and would have arrived at the pullulanases disclosed in Documents (4), (10) and (12) to (15).

In particular the Appellant pointed to:

- the definition in claim 1 of Document (12) of an "operating" range going as high as pH = 10;
- the disclosure in Document (13) of a pullulanase with enzyme stability at 50°C and pH = 9, whereby enzyme inactivation is only observed at pH = 11; and
- the disclosure in Document (14) of pullulanases with a "stable" pH range going up to 11.5.

3.6.4 In replying to the Respondent's observations that the "optimum" pH range for pullulanase activity given in all available documents was at most neutral, the Appellant observed that Document (3') explicitly instructed the skilled person to apply enzymes outside their "optimum" activity ranges, since substantial enzyme activity might also be observed in "non-ideal" conditions.

In the Appellant's opinion, it would have been immediately evident to the skilled reader that the teachings in Document (3') applied particularly well to enzymes to be used in washing processes. Indeed, the pH or temperature ranges conventionally indicated as corresponding to "optimum" enzyme activity, or to some activity and/or stability in general, were determined under conditions simulating food-processing, i.e.

conditions which were more demanding than the "real-life" washing conditions (see page 7 of the grounds of Appeal and page 4 of the Appellant's letter dated 4 November 1999). In particular, the temperature vs. time profile of standard washing processes, as well as the presence of a heterogeneous interface between the washing liquor and the soiled dish or fabric, were comparable to lower temperature and high starch concentration conditions in standard food-processing operations. Accordingly, the teaching in Document (3') (see the third and the last paragraph), that such low temperature and high substrate concentration conditions were known to result in stabilisation of the enzyme activity even under non-ideal pH conditions for food-processing, was to be expected to apply to the washing of dishes or fabric as well.

- 3.6.5 In conclusion, the fact that the cited Documents (12) to (14) mention that pullulanases have an **acidic to neutral** "optimum" pH range would **not** have represented, in the Appellant's opinion, any real prejudice against the use of such enzymes under alkaline conditions.

On the contrary, the fact that these documents implicitly or explicitly disclosed pullulanases' activity or stability also at alkaline pH, combined with the knowledge that (as indicated in Document (3')) enzymes may be sufficiently stable and therefore useful also in non-ideal pH condition, particularly in the presence of high substrate concentrations and lower temperatures, would have suggested to the skilled person that the pullulanases of Documents (12) to (14) would substantially contribute to removal of starchy dirt from dishes or fabrics by washing at pH of 9 to 11, i.e. to produce satisfactory starchy soils

removal.

Therefore, it would have been obvious for the skilled person to solve the existing technical problem (see in point 3.4) by substituting the amylolytic enzymes disclosed in Document (2) by starch-debranching pullulanases and/or isoamylases known from Documents (12) to (14) to have an alkaline operating range and by introducing in such detergent compositions an amount of alkaline substance so as to produce a washing liquor with a pH of 9 to 11. Accordingly, the subject-matter of claims 1 and 9 of the Respondent's request would not involve an inventive step.

3.7 The Board cannot accept the above argumentation for the following reasons.

3.7.1 The Appellant has provided no convincing reasons as to why the skilled person would expect that the debranching of amylopectin should produce better removal of starchy dirt from dishes or fibres than e.g. the random 1,4 cleavage of the same amylopectin by the α -amylase. As is evident from Document (3) (see page 73, last paragraph and Figures 3 and 4), the product resulting from the enzymatic action of α -amylase onto amylopectin - i.e. dextrin - is also soluble, and there is no evidence whatsoever in the available literature suggesting that, as alleged by the Appellant, the branched dextrin should adhere on the substrate surfaces more firmly than linear amylopectin fragments. Therefore, Documents (3) and (5) to (9) do not suggest to the skilled reader of Document (2) that among the amylolytic enzymes mentioned in this document the starch-debranching enzymes are **more** suitable than the other enzymes for producing satisfactory starchy

dirt removal during automatic dish-washing or fabric laundering.

- 3.7.2 Even if it were common general knowledge that at alkaline pH of 9 to 11 certain enzyme-free laundering detergent compositions show increased detergency, Document (2), the sole available document actually disclosing enzyme-containing detergent compositions, still describes for the enzyme-containing detergent compositions concerned a pH range from slightly acid to slightly basic, rather than a fully alkaline pH range.

Moreover, Document (2), after mentioning on page 1, lines 66 to 68, that the enzymes considered are in general active up to a pH = 10, defines a preferred pH range for the detergent compositions not extending above pH = 9. Since the pH of optimum enzyme activity normally lies at about the central portion of the pH range known to general activity, the fact that Document (2) defines for the detergent compositions a pH range which is centred within the wider pH range known for general enzyme activity shows that the authors of this document have considered that enzyme performance during washing processes is generally satisfactory at about the pH range of optimum enzyme activity.

These facts are not consistent with the Appellant's implicit assumption (see point 3.3) that the expected increase of detergency owing to the surfactant activity at increasingly alkaline pH should overcompensate the possible decrease of enzyme activity expected when approaching (or even exceeding) the end points of the pH range for enzyme activity in general.

In the presence of this evident contradiction between the common general knowledge referred to by the Appellant and the explicit teachings in Document (2), the person skilled in the art would, in the Board's judgment, put more weight on the teaching given in Document (2), since this relates to enzyme-containing detergent compositions, i.e. exactly the same technical field of the disputed invention.

- 3.7.3 Therefore, the common general knowledge that enzyme-free laundry detergent compositions produce better soil removal at pH of 9 to 11 is not sufficient to lead the person skilled in the art to disregard the available explicit teaching in Document (2) that enzyme-containing detergent compositions result in satisfactory starchy soil removal from dishes or fabrics at a pH range between 4 and 9 and narrower than the pH range known for the general activity of the enzymes considered.

Thus the Board concludes that the Appellant did not demonstrate convincingly that the notional skilled person would have reasonably expected that the detergent compositions containing starch debranching enzymes were also more likely to produce the desired removal of starchy dirt at an alkaline pH of 9 to 11 rather than at a pH of 4 to 9.

- 3.7.4 All documents on file dealing with pullulanases or amylases disclose an acidic to neutral "optimum" pH for the activity of such enzymes during food-processing operations.

According to the Appellant (see point 3.6.4 above) the person skilled in the art would not inevitably be

dissuaded by such explicit teaching to use the enzymes in alkaline washing liquor, since Document (3') in combination with the data in Documents (12) to (14) disclosed that detergent compositions containing starch-debranching enzymes may produce satisfactory starchy soil removal also in washing liquors at a pH above such "optimum" pH range, i.e. also under non-ideal conditions.

- 3.7.5 However, Documents (3') and (12) to (14) provide only information as to the enzyme activity in food-processing operations. The Appellant too has explicitly recognised the differences (in temperatures vs. time profile as well as in reagent kind and concentration, see point 3.6.4 above) between the conditions used in standard "activity" or "stability" tests developed for simulating operations of food-processing and those of dish-washing or laundering.

Therefore, the data in Documents (12) to (14) as to some enzyme activity or stability at alkaline pH outside such "optimum" pH range do not allow, even when considered in combination with the suggestions in Document (3') as to the possibility of using enzymes under non-ideal conditions, any reasonable prediction as to a satisfactory performance of the respective enzymes under dish- or fabric-washing conditions at pH of 9 to 11, i.e. well outside their "optimum" pH range.

- 3.8 In the Board's judgment, the skilled reader of Document (2) confronted with the existing technical problem (see in point 3.4) would have reasonably expected that the desired level of fat soil detergency may as well be obtained by using in the detergent compositions of Document (2) other amylolytic enzymes,

similar to the enzymes explicitly mentioned in that document. Therefore, the person skilled in the art would have searched for further amylolytic enzymes and would have found (for instance in Document (5)) that pullulanases and/or isoamylases (such as those disclosed also in Documents (4), (10) and (12) to (15)) are similar to the starch debranching enzymes mentioned in Document (2).

However, the skilled person would have also found in all the documents disclosing these starch debranching enzymes clear teachings that pullulanases have a slightly acidic to neutral "optimum" pH range.

Therefore the person skilled in the art, taking into account:

- that the detergent compositions disclosed in Document (2) may also have slightly acidic or neutral pH, and
- that Document (2) defines for the detergent compositions a pH range which is centred within the wider pH range known for general enzyme activity, would have reasonably expected that the use of the starch debranching enzymes of Documents (4), (10) and (12) to (15) in detergent compositions according to the general definitions in Document (2) would succeed in producing a satisfactory level of fat soil detergency when working at a pH **about** the acidic to neutral "optimum" pH range for enzyme activity during food-processing.

3.9 Accordingly, the Board concludes that the subject-

matter of claims 1 and 9 according to the Respondent's main request involves an inventive step under Article 56 EPC, in that it is not obvious for the skilled reader of Document (2) in combination with the other available state of the art that the technical problem of rendering available an alternative to the amylolytic enzyme-containing detergent compositions of Document (2) could be solved by using, **instead of** the specific amylases disclosed in Document (2), pullulanases and/or isoamylases in combination with an amount of alkaline substance producing in the washing liquor a pH well above the "optimum" pH range known for such enzymes.

4. *Inventive step concerning the subject-matter of claims 2 to 8 and 10 to 17*

Independent claim 17 is directed to the use of the detergent compositions defined in claims 1 and 9 as automatic dish-washing or laundering detergent. For the same reasons given above for claims 1 and 9, the Board also finds that the subject-matter of claim 17 involves an inventive step.

Claims 2 to 8 and 10 to 16 refer to specific embodiments of claims 1 and 9 respectively, and derive their patentability from these claims.

5. *Auxiliary requests*

Since the subject-matter of the claims according to the Respondent's main request meets the requirements of Article 56 EPC, the examination of the remaining auxiliary Requests I to VII is not necessary.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside

2. The case is remitted to the first instance with the order to maintain the patent with claims 1 to 17 submitted with the letter of 7 May 2002 (main request) and pages 2, 3, 5 and 17 filed during the oral proceedings and pages 4 and 6 to 16 of the patent as published.

The Registrar:

The Chairman:

G. Rauh

P. Krasa