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D E C I S I O N
of 14 February 2001

Case Number: T 0557/97 - 3.3.6

Application Number: 89304717.5

Publication Number: 0341999

IPC: C11D 3/386

Language of the proceedings: EN

Title of invention:
Enzymatic detergent composition

Patentee:
UNILEVER PLC, et al

Opponent:
Henkel Kommanditgesellschaft auf Aktien
The Procter & Gamble Company

Headword:
Enzymatic Detergent/UNILEVER

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (no) - obvious combination of the technical teaching of two documents of the state of the art"
"Inventive step (no) - explanation of the failure of one single experiment is not a sign for inventive step"
"Inventive step (no) - effect obtained by a novel composition to be expected by those skilled in the art"

Decisions cited:
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Catchword:
-

Case Number: T 0557/97 - 3.3.6

D E C I S I O N
of the Technical Board of Appeal 3.3.6
of 14 February 2001

Appellant: (Proprietor of the patent)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 2 April 1997 revoking European patent No. 0 341 999 pursuant to Article 102(1) EPC.**

Composition of the Board:

Chairman: P. Krasa
Members: G. Dischinger-Höppler

C. Rennie-Smith

Summary of Facts and Submissions

I. This appeal is from the decision of the Opposition Division to revoke European patent No. 0 341 999. The decision was based on the claims as granted.

II. The two notices of opposition, based on lack of novelty and lack of inventive step, relied inter alia on the following documents

(1) US-A-3 983 078 and

(3) US-A-4 707 291.

III. In its decision, the Opposition Division held that the claimed subject-matter lacked an inventive step in view of a combination of documents (1) and (3). It was held that the claimed subject-matter mainly covered embodiments which did not show any unexpected advantage in relation to the prior art.

IV. During the appeal proceedings, the Respondent I (Opponent I) submitted for the first time five further documents, including

(9) H. Andree et al., "Lipases as Detergent Components", Journal of Applied Biochemistry, Vol. 2 (1980), pp 218 to 29.

V. With a letter dated 7 February 2001, the Appellant filed an amended set of claims as an auxiliary request.

VI. This request, with a minor amendment, was refiled as the Appellant's main request at the beginning of the oral proceedings held on 14 February 2001 which were

not attended by the second Respondent (Opponent II) as announced in its letter of 20 October 2000. In the course of these proceedings the Appellant also filed an amended set of claims as a new auxiliary request. The only independent claim of the main request reads:

"1. A detergent composition comprising an anionic surfactant, a nonionic surfactant and a lipase enzyme, characterized in that:

(a) the nonionic surfactant of the composition comprises a nonionic surfactant component selected from alkoxylate adducts of fatty alcohols, fatty acids, fatty esters, fatty amides and fatty amines of at least C_{10} chain length and mean alkylene oxide content of less than 5 alkylene oxide groups per molecule, forming at least 30% by weight of the total nonionic surfactant of the composition;

(b) the total amount of the nonionic and anionic surfactant in the composition is in the range 1% to 30% by weight;

(c) the nonionic surfactant component forms less than 50% by weight of the sum of the nonionic component and the anionic surfactant; and

(d) the lipase is selected from lipases producible by Humicola lanuginosa, Pseudomonas gladioli or Chromobacter viscosum var lipolyticum;

(e) the lipase enzyme is present in an amount of 0.005 to 100 LU/mg based on the weight of the detergent composition."

Claim 1 of the auxiliary request additionally contains the following feature:

"(f) the composition comprises 1-45% by weight of a zeolite builder and is substantially free of phosphorus-containing builder compounds."

VII. The Appellant's arguments can be summarized as follows:

- The closest prior art was a detergent composition containing a combination of a specific class of lipases with a mixture of an anionic surfactant and a nonionic surfactant having an ethoxylation degree of 7 or 11 as disclosed in document (3).

- It was known in the art that lipases chemically degraded fatty material into fatty acids but that the lipase activity was low in detergents.

- It was evident from the examples of the patent in suit that the present invention consisted in a further development of the composition of document (3) for enhancing the lipase activity by the inclusion of a nonionic surfactant having an ethoxylation degree of below 5.

- A person skilled in the art would not have combined the disclosures of documents (1) and (3) since document (1) did not relate to lipase activity. On the contrary, it disclosed detergents containing a mixture of nonionic surfactants having high and low ethoxylation degrees for physically solubilising the fatty material. This made any addition of lipase redundant.

- Further, any combination of documents (1) and (3) would not necessarily lead to the claimed subject matter since document (1) suggested detergent compositions with less than 50% by weight of their surfactants being other than nonionic surfactants.

- An additive effect or a synergistic effect - as was shown in the examples of the patent in suit - as a result of the combination of lipase with nonionics having a low alkoxylation degree was not to be expected since the two different reaction mechanisms were in competition with each other.

- Document (9) was more relevant than document (1) since it taught that the lipase activity could be enhanced by solubilization. However, the detergent composition should not contain anionic surfactants, and solubilizers other than nonionics with low ethoxylation degree are shown to work much better.

Concerning the auxiliary request, the Appellants argued that the particular embodiment with zeolite as the builder was nowhere previously described and showed the effect of improved lipase activity more clearly.

VIII. The Respondent I, in essence, argued as follows:

- The effect of nonionics with low ethoxylation degree, which is the only distinguishing feature between the claimed subject-matter and the disclosure of document (3), on lipase in detergent compositions was known from document (9).

- The solubilising effect described in document (1)

was not in contradiction to the fat-splitting effect of lipases.

- The examples of the patent in suit did not show that the activity of the lipases was improved.

- Zeolites as builders were common in the art.

The second Respondent (Opponent II), in writing, supported the opinion set out in the contested decision and maintained its arguments submitted during the opposition proceedings.

IX. The Appellant requested that the decision under appeal be set aside and that the patent be maintained in amended form according to the main request or alternatively the auxiliary request, both as filed during the oral proceedings.

The Respondents requested (in the case of the second Respondent in writing) that the appeal be dismissed.

Reasons for the Decision

1. *Late-filed documents*

The Appellant did not object to an admission of the late-filed documents and based its own arguments on document (9). This was also the only late-filed document relied on during the oral proceedings by Respondent I which combined its disclosure with that of documents filed in time. Therefore, document (9) will be considered by the Board.

2. *Main request*

2.1. Amendments

The amendment made to Claim 1 meets the requirements of Article 123(2)(3) EPC since it merely consists in a limitation of its scope with respect to the particular lipases mentioned in dependent Claim 5 as originally filed (corresponding to dependent Claim 4 as granted). Further, the amendment does not give rise to objections under Article 84 EPC.

2.2 Novelty

During the appeal proceedings, none of the Respondents explicitly objected to lack of novelty. Since the appeal fails for the reasons given below, this need not be considered in further detail.

2.3 Inventive step

It remains, therefore, to assess whether or not the claimed composition is based on an inventive step.

2.3.1 Technical background

The patent in suit relates to an enzymatic detergent composition which contains a lipolytic enzyme (page 2, lines 2 to 3).

According to the patent enzymatic detergent compositions are well known in the art, but it is mentioned that in the case of lipases their mere addition to any detergent composition would not necessarily result in a satisfactory composition as

regards both the enzyme activity and the cleaning efficiency, since various ingredients of detergent compositions have a negative influence on the lipolytic enzyme (page 2, lines 10 to 21).

2.3.2 Closest prior art

Nevertheless, the patent in suit makes reference to several prior art detergent compositions containing specific lipase enzymes, in particular to the compositions of document (3) (patent in suit, page 2, lines 22 to 55).

This document, which also recognized the problem of compatibility of mixtures of certain lipolytic enzymes and detergency compounds (column 1, lines 11 to 28), discloses a particular class of lipases (column 2, line 25 to column 3, line 21), including lipases ex *Humicola lanuginosa* (column 5, line 42, column 8, line 67), ex *Chromobacter viscosum* var. *lipolyticum* (column 5, line 41, column 3, lines 1 to 3 and 16 to 17) and ex *Pseudomonas gladioli* (column 9, lines 19 to 29) to be used in detergent compositions in order to overcome this stability problem and provide improved overall detergency performance (see column 2, lines 3 to 24). The compositions comprise from 1 to 30% by weight of a mixture of an anionic surfactant and a nonionic surfactant in the weight ratio ranging from 12:1 to 1:12 and a lipase enzyme in an amount of 0.005 to 100 LU/mg of the composition (see Claim 1 and column 3, lines 22 to 26 and 38 to 55). The compositions according to Examples I to XII contain 6.5% or 8.5% by weight of sodium dodecylbenzene sulfonate as the anionic surfactant, 2% or 4% by weight of C_{12}-C_{15} primary alcohol ethoxylated with 11 or 7 moles

of ethylene oxide as the nonionic surfactant and 1, 3, 15 or 17 LU/ml of lipase.

Document (3) does not disclose the presence of nonionics with an ethoxylation degree of below 5, which thus forms the only difference from the claimed subject-matter.

2.3.3 Technical problem

The problem the patent in suit seeks to solve consists in the provision of lipase containing detergent compositions with improved overall detergency over e.g. the compositions of document (3) (page 3, lines 3 to 6).

The Appellant submitted that on a proper construction of the patent in suit, in particular of the examples given, it would be apparent that the problem actually solved consisted in an improvement of the lipase activity within a detergent composition, i.e. the effect which can be ascribed to the chemical action of lipase on the fatty soil.

This approach is, in the Board's opinion, based on the theoretical explanation of what is the outcome of a particular modification of the prior art. It suggests that a particular effect obtained by a hitherto unknown embodiment could be the problem to be solved. This would, however, be a purely speculative and unrealistic problem in the absence of any hint of such a problem in the prior art. In contrast, the above defined problem of improving overall detergency as against the prior art is, for whatever reason, always present in the mind of those concerned with the development of detergent

compositions.

The Board has not overlooked that document (9) mentions the possibility of enhancing the lipase activity by emulsifiers. Some specific emulsifiers are used and it is stated that these emulsifiers lead to a slight improvement of the washing performance of either the detergent or the lipase (page 227, Table V and last two lines to page 228, line 7).

This is, in the Board's opinion, not in contradiction to an improvement of the overall detergency, the more so as it is evident, from the examples given in the patent in suit, that "improved overall detergency" means improved removal of fatty material on the one hand and improved whiteness or brightness (increased reflectance) on the other hand.

2.3.4 Solution of the problem

Compared with the compositions of document (3), the solution proposed to solve this problem consists in at least 30% by weight of the total amount of the nonionics having an ethoxylation degree of below 5 (page 4, lines 28 to 34).

The examples given in the patent in suit show that, with the exception of one experiment, in general an improvement in this overall detergency is obtained.

From a comparison of Example D with the corresponding Example C, it is seen that worse results, both with respect to the reflectance value and the fatty removal, are obtained with the claimed subject-matter when using 15 LU/ml lipolase ex Novo.

Taking into consideration that all but one test result indicate that the improved overall detergency aimed at (in terms of fat removal and of reflectance) is indeed achieved by the claimed subject-matter, that single result is insufficient to dissuade the Board from finding that the technical problem as above defined was plausibly solved by the claimed subject-matter (see also 2.3.8 below).

2.3.5 It remains to be decided whether, in view of the available prior art documents, it was obvious for someone skilled in the art to solve the problem of improved removal of fatty material and/or increased reflectance by the means claimed.

The problem to which document (3) provides a solution is the same as that of the patent in suit, namely to improve the overall detergency performance of lipase-containing detergent compositions in the same respects as the patent in suit, namely fat removal and brightness (column 2, lines 7 to 11 and Examples). It is therefore self-evident that it does not contain any suggestion how to further improve its own essential disclosure.

A person skilled in the art of detergent compositions trying to improve those disclosed in document (3) is therefore forced to consider other documents dealing with detergent efficiency. He would consider document (1) which discloses that superior oily soil removal can be obtained by using certain combinations of short-chain and long-chain alkylene oxide nonionic surfactants (column 2, lines 28 to 33).

A suitable mixture of such nonionic surfactants is, for

instance, a mixture of Tergitol 13-S-9 and Dobanol 91-4 (see Table I, column 10, and Example III). As indicated in column 9 (legend of Table 1), Tergitol 13-S-9 is a secondary alcohol with an average hydrocarbon chain length of 12 ethoxylated with 9 moles of ethylene oxide and Dobanol 91-4 is an adduct of four moles of ethylene oxide of a mixture of fatty alcohols having an average molecular weight of 160 and chain lengths between C_9 and C_{11}, with the major proportion being C_{10}. Since pure decanol has a molecular weight of 158, Dobanol 91 fulfills the required minimum hydrocarbon chain length of 10.

As is explained in this document, it is believed that the short-chain alkoxylated nonionic facilitates solubilisation of the oil by being rapidly transported into the oil phase where it co-acts with the long-chain alkoxylated nonionic present in the aqueous phase to cause the oil to disperse more rapidly and effectively and dissolve in the aqueous liquor (column 3, line 42 to column 4, line 2).

2.3.6 The Appellant argued that a person skilled in the art would not have considered document (1) since it did not relate to detergent compositions containing lipase as an essential ingredient and, hence, did not pertain to the improvement of the lipase activity. Instead it related to the quite different object of physical removal of the oily soil by solubilization. Moreover, this improved physical removal of oils according to document (1) would render any addition of lipase superfluous once the oily stain has been solubilized.

In fact, none of the examples given in document (1) include lipase as an essential adjuvant, let alone any

particular amount thereof. Still, the presence of lipases (= lipolytic enzymes) in the compositions of document (1) is explicitly contemplated (see column 12, lines 56 to 59), in particular if lipases are used which do not pose stability problems with certain detergent compositions (column 12, lines 65 to 68). This is exactly what document (3) promises for the particular lipases used in its compositions (see 2.3.2 above).

The Board is, therefore, satisfied that solubilization is one aspect of soil removal in detergent compositions always considered by those skilled in the art. It is also present in the compositions of document (3) even if the surfactant mixture in this case may be less efficient.

2.3.7 The Appellant further submitted that a combination of document (1) and (3) would not necessarily lead to the claimed subject-matter since - contrary to the claimed subject-matter - much more than 50% of the surfactant of the compositions of document (1), as described in column 3, lines 3 to 27, was nonionic.

This argument must fail for the following reason:

Claim 1 of the patent in suit requires that "the nonionic surfactant component forms less than 50% by weight of the sum of the nonionic component and the anionic surfactant" (see feature (c) of Claim 1). In feature (a) the nonionic surfactant component is defined as the short-chain ethoxylated nonionic surfactant.

The detergent compositions disclosed in column 3 of

document (1) consist of 15 to 40% by weight of an ethoxylated nonionic surfactant, 1 to 20% by weight of another detergent compound which may be anionic, and 30 to 70% by weight of a detergency builder, 60 to 80% by weight of the total amount of the nonionics being a primary alcohol having an average of 10 carbon atoms condensed with four ethylene oxide groups and 20 to 40% by weight being a secondary alcohol condensed with 7 to 9 ethylene oxide groups (see column 3, lines 3 to 27). The amount of the short-chain nonionic surfactant component in document (1) may, hence, be as low as 9% by weight while an anionic surfactant may be present in an amount of up to 20% by weight.

Moreover, it is stated that these compositions can be employed singly or added to commercial-type detergent compositions to enhance their oil removal properties (column 3, lines 31 to 39).

A skilled person seeking to improve the oil removal efficiency of known detergent compositions, e.g. those disclosed in document (3), is therefore taught to include therein this particular composition of document (1).

Example III of document (1) discloses one embodiment of such a final detergent composition which comprises a branched chain alkylbenzene sulfonate as an anionic surfactant in an amount of 20% by weight and 5% by weight of a nonionic surfactant consisting of Dobanol 91-4 and Tergitol 13-S-9 in a weight ratio of 4:1.

Therefore, document (1) explicitly suggests final detergent compositions having the same kind and the same high amount of anionic detergent as required in

the compositions of document (3). Those skilled in the art would therefore have tried the particular mixture of nonionic surfactants of document (1) in the compositions of document (3) since this promised an improved soily oil removal.

2.3.8 The Appellant further pointed to the aberrant result in the examples of the patent in suit (see 2.3.4 above). This - so it argued - showed that the physical and chemical removal of oily stains by lipase and solubilization, respectively, were competing reaction mechanisms. A skilled person would, therefore, not have expected that the combination of lipases and solubilizers could provide an additive or even over-additive effect as was shown in a large number of the other examples.

The Board accepts that sometimes not all of the experiments carried out with claimed subject-matter may succeed. Sometimes an insufficient result may be based, for example, on an experimental error. But the failure of an experiment representing an embodiment of the subject-matter for which protection is sought can hardly be taken as evidence in favour of its inventiveness, unless it would for other reasons be apparent to those skilled in the art that in this experiment exceptional and undesired conditions had prevailed.

In any case, these results, not being state of the art, could not have prevented the skilled person from applying the technical teaching of document (1) to that of document (3).

2.3.9 For these reasons, a person skilled in the art would

not have needed any further information in order to arrive at the claimed subject-matter. Thus, document (9) which is a paper describing a systematic investigation of the performance of certain lipases in certain detergents need not be considered further in this context.

Concerning this document, the Appellant submitted that it warned the skilled person not to use any anionic surfactant in the mixture since the anionic surfactant deactivated the lipase (page 221, Table II and lines 7 to 10 after this table). Moreover, as was shown in Table 5 (page 227), emulsifiers other than short-chain ethoxylated nonionics performed much better as detergents and showed a more improved lipase activity.

However, any prejudice against the use of anionic surfactants in lipase-containing detergents has already been overcome by the compositions disclosed in the later document (3), at least for the particular group of lipases used therein. Further, the short-chain ethoxylated nonionics are, after all, recommended in document (9) and would, therefore, also have been tried by someone skilled in the art.

2.3.10 The Board therefore concludes that, for the purpose of improving the detergency of the compositions of document (3), the skilled person would have readily used as the nonionic surfactant the particular mixture of short-chain and long-chain alkoxylated alcohols of document (1) with the expectation of an improved removal of fatty stains.

Any improvement independent of its extent would, therefore, be derived by a person skilled in the art in

an obvious manner from the prior art.

For these reasons, the main request must fail.

3. *Auxiliary request*

No objections under Articles 84 and 123 EPC arise from the restriction of the subject-matter of Claim 1 with respect to the builder and the amount thereof to be used in accordance with Claim 9 as originally filed (corresponding to Claim 7 as granted).

It does, however, not add any inventive feature to Claim 1 of the main request since the use of zeolites in amounts falling within the claimed range is also considered in document (3) (Example XIII).

The same conclusions as drawn for Claim 1 of the main request (see 2.3.9 above) therefore apply mutatis mutandis to Claim 1 as worded in the auxiliary request.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

G. Rauh P. Krasa