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**Datasheet for the decision
of 13 January 2025**

Case Number: T 0222/22 - 3.3.06

Application Number: 13801595.3

Publication Number: 2929004

IPC: C11D3/386, C11D3/48

Language of the proceedings: EN

Title of invention:
PREVENTING ADHESION OF BACTERIA

Patent Proprietor:
Novozymes A/S

Opponent:
Danisco US Inc.

Headword:
PREVENTING BACTERIA ADHESION/Novozymes

Relevant legal provisions:
EPC 1973 Art. 56

Keyword:
Inventive step (yes) - non-obvious modification

Decisions cited:

Catchword:



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Case Number: T 0222/22 - 3.3.06

D E C I S I O N
of Technical Board of Appeal 3.3.06
of 13 January 2025

Appellant: Danisco US Inc.
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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 17 November
2021 rejecting the opposition filed against
European patent No. 2929004 pursuant to Article
101(2) EPC.**

Composition of the Board:

Chairman J.-M. Schwaller
Members: P. Ammendola
R. Winkelhofer

Summary of Facts and Submissions

- I. This appeal lies from the decision of the opposition division to reject the opposition filed against European patent No. 2 929 004.
- II. With its grounds of appeal, the opponent submitted that claim 1 as granted (main request) and claim 1 of at least auxiliary requests 1 and 2 pending before the opposition division lacked an inventive step over **D1** (US 2008/0293607 A1) or **D6** (WO 2007/087319 A2) alone, as well as over **D13** ("*Malodor in Laundry*", S. Munk, Ph.D. Thesis, 2001, Technical University of Denmark) in combination with **D2** (WO 2011/098579 A1), the latter also making reference to **D3** (EP 0 511 456 A1).
- III. The patent proprietor (hereafter respondent) replied on 5 August 2022, enclosed with nine sets of amended claims labelled as auxiliary requests 1 to 9, whereby auxiliary request 1 corresponds to auxiliary request 2 in opposition, claim 1 of which reads:
- "1. A washing method for textile comprising:*
- a. exposing a textile to a wash liquor comprising a detergent composition comprising one or more anionic surfactants; an enzyme selected from the group consisting of: a protease, a lipase, a cutinase, an amylase, a carbohydrase, a cellulase, a pectinase, a mannanase, an arabinase, a galactanase, a xylanase, and an oxidase;*
 - and a DNase;*
 - b. completing at least one wash cycle; and*
 - c. optionally rinsing the textile."*

Claims 2 to 4 define preferred embodiments of the washing method described in claim 1.

IV. At the oral proceedings held before the board on 13 January 2025, the respondent withdrew the pending main request and the appellant disputed claim 1 of auxiliary request 1 for lack of inventive step in view of D13 in combination with D2 and D3, or in view of D1 alone, or in view of D6 alone. Auxiliary request 1 was thus the new **main request**. The parties' final requests were as follows:

The appellant requested that the decision under appeal be set aside and the patent be revoked.

The respondent requested that the patent be maintained in amended form based on auxiliary request 1 filed with the reply to the appeal (**main request**) or, as an auxiliary measure, based on one of **auxiliary requests 2 to 9**, also filed with the reply to the appeal.

Reasons for the Decision

1. *Main Request - Inventive step*

1.1 Technical problem

1.1.1 According to the opposed patent (see paragraph [0002] and the Examples), the method for textile washing defined in claim 1 under dispute, due to the presence of DNase in the wash liquor, reduces malodor and soil redeposition.

1.1.2 The appellant stressed that claim 1 did not specify the type of DNase or its minimum concentration in the wash liquor, nor did it require the reduction of malodor or

soil redeposition. Hence, it was relevant that Tables 1 and 2 of the patent in suit showed that the specific DNases used in Example 1 achieved prevention of adhesion and biofilm removal for only some of the tested bacteria, and only at certain concentrations.

Thus, and also in view of the teachings in the patent in suit - in particular paragraph [0005] stating that "[t]he present invention provides a solution to odor problem by reducing the adhesion of certain specific bacteria to the textile surface during wash") and paragraph [0116] (which explained the tests whose results are reported in Tables 1 and 2) - it was apparent that the improvement on malodor that the patent in suit alleged to be caused by the presence of DNase in the wash liquor was demonstrated by the patent Example 1 not to occur across the scope of claim 1.

The appellant also considered the tests whose results were reported in the other Examples of the opposed patent to be unrelated to the consequences of the adhesion of bacteria and the formation of biofilms, and thus artificial. As a result, already upon reading the patent in suit *per se* it would be apparent that the technical problem of reducing malodor of washed textile, that the opposed patent identifies as solved by the washing method of the invention, could not have been solved across the scope of claim 1. Hence, this technical problem should not play a role in determining which prior art was suitable as starting point for the assessment of inventive step.

- 1.1.3 The board notes that the data in Tables 1 and 2 of Example 1 show that both DNase tested therein prevent (apparently to a full extent), already at concentrations of few ppm, the adhesion of at least

some of the tested bacteria, and remove (apparently to a full extent) at slightly higher concentrations the biofilms made by at least some of these bacteria.

Since it is self-evident to the skilled person (and undisputed) that the tested bacteria were representative of those normally present when washing textiles and significantly contributing to the problem of malodor (see second sentence in paragraph [0005] and first section within Example 1 of the opposed patent), the results in Tables 1 and 2 of Example 1 are consistent with the explicit statement in the above-cited passage of paragraph [0005], which clearly states that the claimed invention addresses the odor problem "*by reducing the adhesion of certain specific bacteria*" (emphasis added). Hence, the results in Example 1 are consistent with the definition of the technical problem aimed at in the patent in suit.

Nor is there any reason that would justify to instead construe paragraph [0005] (as implied by the appellant's line of argument) to necessarily require that the aimed technical problem would only be solved, when achieving (complete) prevention of adhesion of any of the bacteria that had been identified to contribute substantially to malodor, and (complete) removal of any biofilm formed by (any of) these bacteria.

- 1.1.4 For the board, the results in Examples 3 and 5, although relating to an "artificial" model (in the sense that they do not attempt to simulate the presence of bacteria producing bad odor or their biofilm on the tested textile swatches), clearly aim to demonstrate that the presence of DNA on the textile surface – also occurring in real-life textile washing – could contribute to malodor by favoring the retention of

chemical compounds responsible for the bad smell, such as "*E-2-Nonenal*" (which the patent defines as a compound that "contributes to the malodor on laundry", see paragraph [0138]). D13 too comprises at least two scientific papers (identified as Papers 1 and 2 in the "Contents" section of D13) in which *E-2-Nonenal* is listed among the "Odorants" of dirty textiles. Hence, Examples 3 and 5 are evidence of an additional effect (in addition to those supported by Example 1, resulting from reducing the adhesion of at least some of the bacteria causing the malodor and from promoting the removal of biofilms containing some of these bacteria) that results from the presence of DNase in the wash liquor and could contribute to the reduction of malodor.

- 1.1.5 Furthermore, the data in Tables 1 and 2 of Example 1 do not undermine the plausibility of the results of the tests in Examples 2 and 4, which provide evidence that the presence of DNase improves the whiteness of washed textiles, particularly by preventing soil redeposition. In fact, the patent in suit contains no teaching that links the cleaning effects of DNase to the prevention of bacterial adhesion and/or the removal of biofilms formed by such bacteria.

To conclude, the evidence in Examples 2 and 4 demonstrates that the presence of DNase in the wash liquor also promotes good cleaning results, in particular by preventing the redeposition of soil. This is especially evident from the table in Example 2, where the "*Remission value*" measured on polyester textile swatches washed with "*Model detergent A*" is superior to those achieved using 8 out of the 10 commercial laundry compositions taken as a comparison.

- 1.1.6 Thus, the board also concurs with the finding of the opposition division that "[t]he *disputed patent shows an improvement on malodor, anti redeposition and whiteness when using a detergent with a DNase compared to a detergent without a DNase*".
- 1.1.7 In addition, it is self-evident that the tests carried out in the patent examples have been designed to also render easy and reliable the measure of the relevant effects. In most of these tests the DNase concentration ranged from 0.5 ppm to few ppm. The fact that DNase concentrations of 30 or 100 ppm were used in the remaining tests is no reason to conclude that DNase was proven active only at these higher concentrations. Therefore, the respondent's argument is convincing that the effects of DNase observed in the patent examples should, in the absence of any evidence of the contrary, also be expected to occur to some extent whenever using any DNase at any reasonable concentrations (i.e. at those concentrations that a skilled person would predict technically meaningful for enzymes in the wash liquor).
- 1.1.8 Hence, for the skilled reader of the patent in suit, there is no reason to exclude that the technical problem in terms of reduction of malodor and prevention of soil redeposition presented as solved in paragraph [0002] would be solved across the breadth of claim 1 under dispute. Thus, such technical problem is relevant also for determining the prior art suitable as starting point for the assessment of inventive step of claim 1.
- 1.2 Closest prior art
- 1.2.1 None of the parties disputed the finding of the opposition division that the washing of textiles

disclosed in D13 (see abstract of the thesis and pages 75-86 of "Paper 3") deals with a problem similar to the one addressed in the patent in suit, because also D13 refers to the problem of malodor formation on textiles during laundry and its inhibition with specific enzymes, and thus represents a suitable starting point for the assessment of inventive step for the method of claim 1. It is also undisputed that the "*haloperoxidase*" used in D13 (first sentence of the Abstract on page 75) is an oxidase in accordance with claim 1 under consideration, and that the "*European color powder detergent*" used for washing the textiles in D13 (Abstract on page 75) must contain surfactants.

Hence, the claimed washing method differs from this prior art for the additional presence of a DNase and for the selection of the anionic surfactant.

- 1.2.2 The appellant argued that, even though the prior art disclosed in D1 did not even mention malodor or soil redeposition, this document nevertheless disclosed (implicitly) in claims 33 and 34 textile washing methods using amylase and DNase, from which the subject-matter of claim 1 at issue only differed in that the latter required the presence of anionic surfactant(s). Hence, it was justified to assess if the subject-matter of claim 1 at issue also involved an inventive step over the prior art disclosed in D1.

The appellant further stated that a similar reasoning applied to D6 (which also does not mention soil redeposition or malodor), in particular claims 19 and 20 in combination with page 32, lines 29 to 31, whose combination would thus disclose a washing method using (lipase and) DNase.

1.2.3 The board observes that the assessment of inventive step must reflect a realistic and objective understanding of the state of the art. Accordingly, the prior art against which the technical contribution of the patented invention is assessed must thus be identified in a realistic manner, and free from hindsight bias.

1.2.4 In the present case, it is undisputable that within the whole disclosure in D1 (including that of claims 33 and 34 therein) the presence of a DNase is only mentioned in a list of alternatives (for the further enzyme in addition to the amylase described as mandatory in D1). Hence, and even though according to the established jurisprudence of the Boards of Appeal the description of a list of equally suggested alternatives also provides the direct and unambiguous disclosure of each of the listed alternatives, it is also relevant for a realistic understanding of the state of the art that in D1 there is no direct or indirect pointer to the DNase alternative.

Moreover, while D1 does not even mention the malodor formation or soil redeposition occurring in textile washing methods addressed by the patent in suit, it is relevant to mention that this specific technical problem is addressed in the PhD Thesis D13, which includes several distinct scientific publications relating to the same technical problem.

1.2.5 Hence, the choice of the laundering washing method using DNase disclosed in D1 as a possible basis for the assessment of the technical contribution to the art by the claimed textile washing method is unreasonable and influenced by hindsight. Therefore, already for this reason, the appellant's objection that the subject-

matter of claim 1 under dispute would be obvious starting from the prior art disclosed in D1 is unconvincing.

1.2.6 The arguments above apply identically to D6, since also in this document the presence of DNase is only mentioned (on page 32, lines 29 to 31) within a list of alternatives not accompanied by any further pointer thereto, and also such disclosure is given in the context of prior art addressing a technical problem admittedly different from that addressed in the patent in suit. Hence, also the choice of the prior art disclosed in D6 as starting point for the assessment of inventive step is unreasonable and influenced by hindsight.

1.2.7 Accordingly, the sole objection under Article 56 EPC to deal with is that starting from the prior art disclosed in D13.

1.3 Technical problem solved

1.3.1 The appellant stressed the indisputable absence of any experimental comparison between the embodiments of the claimed textile washing method and the prior art disclosed in D13, differing solely by the presence of DNase in addition to the haloperoxidase (or laccase). Hence, there was no evidence on file of a technical advantage resulting from the inclusion of DNase in the textile washing method described in D13. Moreover, the patent in suit did not even merely allege, let aside made it plausible that a particular technical effect would arise from the presence of the anionic surfactant required by claim 1. Thus, the subject-matter of this claim might only solve the

technical problem of providing an alternative to the prior art.

- 1.3.2 The board notes, as already indicated in points 1.1.3 to 1.1.5 above, that the patent examples demonstrate that the presence of DNase in the wash liquor reduces the formation of malodor and soil redeposition.

The appellant has not even alleged, let aside demonstrated with experimental evidence or sound technical reasoning, that the antimicrobial haloperoxidase or laccase used in D13 would necessarily interfere with the enzymatic activity of DNase, let aside that they would do so in such a way to e.g. disfavour or render undetectable the DNase's own contribution to the reduction of malodor or of soil redeposition.

On the contrary, the teachings in the patent in suit suggest that the DNase reduces malodor due to its enzymatic action on the DNA present on the textile, which also prevents bacteria adhesion and promote removal of biofilm. In D13 instead, the reduction of malodor is attributed to the antimicrobial activity of the two used enzymes. Hence, there is no reason to expect that these enzymes might adversely interfere one with the other.

In addition, as also pointed out by the appellant, D13 explicitly highlights the limited efficacy in malodor reduction when washing textiles using antimicrobial enzymes, particularly on cotton. Therefore, it cannot be presumed that already the use of such enzymes completely resolves the malodor issue (and thus that there would be no room for further improvement possibly caused by the DNase).

Thus, in the absence of evidence to the contrary, the skilled reader of the patent in suit and D13 must conclude that in the method of claim 1 under dispute, the DNase would additionally contribute to the reduction of malodor and of soil redeposition on the washed textile, even when the other enzyme used in the claimed method is, for instance, the antimicrobial haloperoxidase (already known from D13 to reduce malodor). Consequently, an improved reduction of malodor and cleanliness compared to the prior art can reasonably be expected with the method of claim 1 at issue due to the additional presence of DNase.

1.3.3 Accordingly, the subject-matter of claim 1 solves vis-à-vis the closest prior art the technical problem of providing a washing method for textile with improved reduction of malodor and of soil redeposition.

1.4 Obviousness of the solution

1.4.1 In the present case the assessment of inventive step boils down to the question whether a skilled person, starting from the textile washing method of the prior art and aiming at reducing malodor on the washed textile, would have modified the prior art by adding a DNase in the wash liquor.

1.4.2 The appellant submitted that D13 would point to the ability of the bacteria causing malodor, to resist when embedded in the biofilm, in particular on cotton swatches. Hence this teaching represented the pointer for the skilled person searching for a solution to the posed technical problem to look in the field of biofilm removal and destruction, thereby arriving at D2.

1.4.3 However, even when assuming in favor of the appellant that D13 does indeed provide a clear and unambiguous implicit teaching that the poor results observed when using antimicrobial enzymes in certain tests are necessarily due to the embedding of surviving bacteria in biofilms, such a teaching would still only justify investigating the technical field of textile washing methods. Specifically, it would point to investigate whether the prior art has successfully addressed the prevention or reduction of biofilm formation on washed textiles.

1.4.4 D2 (see the abstract) instead does not pertain to the technical field of textile washing processes but rather to the development of anti-biofouling compositions for medical applications, or for disrupting and preventing biofilm formation on surfaces. D2 provides detailed teachings on the benefits of biofilm disruption in the medical and pharmaceutical industries but does not address biofilm formation on washed textiles, let alone suggest that the disclosed anti-biofouling compositions could prevent or remove biofilm on such textiles.

The only passage in D2 related to the laundry field is paragraph [00144] which mentions, also by making reference to D3, that the anti-biofouling compositions "can be formulated in an analogous manner" to enzyme-containing detergent formulations for textile and kitchen cleaning. However, this does not amount to a clear instruction or an indirect suggestion to also use the anti-biofouling compositions of D2 in laundry washing.

1.4.5 Therefore, as correctly pointed out by the respondent, the teachings of D13 do not point toward the technical field addressed by D2. Consequently, the skilled person

would not combine the teachings of D13 with those of D2 to solve the posed technical problem.

- 1.4.6 Hence the sole remaining inventive step attack of the appellant fails.
- 1.4.7 Since it is undisputed that no available prior art suggests that the presence of a DNase in the wash liquor may contribute to the reduction of malodor and of soil redeposition on washed textile, the prior art does not render obvious the solution to the posed technical problem described in claim 1 of auxiliary request 1. Hence, this claim (and by the same token claims 2 to 4, which describe preferred embodiments of the method of claim 1) complies with Article 56 EPC.
2. Hence, the set of claims of auxiliary request 1 complies with all requirements of the EPC and this request, which is the appellant'S main request, can be allowed.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the opposition division with the order to maintain the patent on the basis of claims 1 to 4 of auxiliary request 1 as submitted with the reply to the appeal, and the description to be adapted, where appropriate.

The Registrar:

The Chairman:



A. Wille

J.-M. Schwaller

Decision electronically authenticated