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Datasheet for the decision of 31 May 2017

Case Number: T 0420/14 - 3.3.03

Application Number: 08801837.9

Publication Number: 2209816

IPC: C08B37/00

Language of the proceedings: EN

Title of invention:
PROCESS FOR THE PREPARATION OF PURIFIED BETA-(1,3)-D-GLUCANS

Patent Proprietor:
Cargill, Incorporated

Opponent:
BASF SE

Relevant legal provisions:
RPBA Art. 13(1), 12(4)
EPC Art. 100(b), 54, 56

Keyword:

Documents submitted with the statement setting out the grounds of appeal - no reason to hold inadmissible
Late-filed document - justification for late filing (no)
Grounds for opposition - insufficiency of disclosure (no)
Novelty - (yes)
Inventive step - effect not made credible within the whole scope of claim - main request (no)
Auxiliary requests not properly substantiated - not be taken into account

Decisions cited:

G 0004/95, T 0332/87, T 0939/92, T 0199/00, T 0217/10

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Case Number: T 0420/14 - 3.3.03

D E C I S I O N
of Technical Board of Appeal 3.3.03
of 31 May 2017

Appellant: (Opponent)	BASF SE Carl-Bosch-Strasse 38 67056 Ludwigshafen (DE)
Representative:	Vos, Derk Maiwald Patentanwalts GmbH Elisenhof Elisenstraße 3 80335 München (DE)
Respondent: (Patent Proprietor)	Cargill, Incorporated 15407 McGinty Road West Wayzata, MN 55391 (US)
Representative:	Morariu Radu, Mihai Dorin Cargill R&D Centre Europe BVBA Bedrijvenlaan 9 2800 Mechelen (BE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 25 November 2013 rejecting the opposition filed against European patent No. 2209816 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	D. Semino
Members:	F. Rousseau
	R. Cramer

Summary of Facts and Submissions

I. The appeal lies from the decision of the opposition division rejecting the opposition filed against European patent 2 209 816.

II. Claim 1 as granted reads as follows:

"A process for the preparation of purified β-(1,3)-D-glucans, comprising:

providing an aqueous β-(1,3)-D-glucan initial solution having a pH of above 11.0;
filtering the aqueous β-(1,3)-D-glucan initial solution to obtain a β-(1,3)-D-glucan containing filtrate;
adjusting the pH of the β-(1,3)-D-glucan containing filtrate with an acid to a pH of below 5.0 to obtain an acidic β-(1,3)-D-glucan solution;
heating the acidic β-(1,3)-D-glucan solution to a temperature in the range of 60 to 160 °C."

III. The following documents had been cited, *inter alia*, during the first instance proceedings:

D2: translation of D1 (JP 2004-321177) into English
D3: US 4,774,093.

IV. According to the reasons of the decision, the process as defined by the steps of claim 1 was considered sufficiently disclosed, as paragraphs [0016] to [0025] of the patent in suit provided sufficient information as to how to perform the four steps of claim 1. Whether the initial viscosity could be regained or not was not decisive for the issue of sufficiency of disclosure, but related to the issue of inventive step. Document D2 disclosed in claim 4, combined with claims 3 and 1 a

method for the preparation of an aqueous β-(1,3)-D-glucan solution having a pH of 13 or more for reducing its viscosity. According to claim 9 insoluble matter containing micro-organisms was removed and claim 11 further disclosed bringing the aqueous solution back to an acidic pH. D2 suggested that the removal of insoluble substances could be achieved in several ways, e.g. filtration in paragraph [0020], that step being optional as shown on page 11, lines 1-5. D2 also explicitly disclosed a process wherein the filtration step was carried out after reducing the pH from alkaline to acidic. The disclosure of D2 was thus not clear as to whether the filtration step was carried out or not, an if, at which stage of the process. In addition, there was no clear disclosure of a heating step according to claim 1 of the patent in suit. Novelty over D2 was therefore acknowledged. That document represented the closest prior art in agreement with both parties, contrary to D3 which did not relate to the problem of purifying aqueous β-(1,3)-D-glucan solution and was therefore more remote. Because it had not been shown that the claimed process resulted in a complete recovery of the initial viscosity of the β-(1,3)-D-glucan solution, the objective problem solved over D2 could only be considered as the provision of a method for increasing the viscosity of a purified acidic aqueous solution of β-(1,3)-D-glucan as disclosed in D2. D3 did not relate to increasing the viscosity of β-(1,3)-D-glucan solutions but to their gelation, which gelation was irreversible when the β-(1,3)-D-glucan solutions were heated. Accordingly, the use of an heat treatment as defined in claim 1 as a solution to said objective problem was not suggested by D3. The subject-matter of claim 1 was therefore inventive.

V. An appeal against that decision was lodged by the opponent (appellant).

VI. With the statement setting out the grounds of appeal, the appellant submitted the following documents:

D7: L. Johansson *et al*, "Hydroylsis of β-glucan", Food Chemistry, 97 (2006) 71-79
D8: "Versuchsergebnisse zur "sauren Hydrolyse" der β-(1,3)-D-glucan"
D9: M. Sletmoen *et al*, "Review Higher Order Structure of (1,3)-β-D-Glucans and Its Influence on Their Biological Activities and Complexation Abilities", Biopolymers, Volume 89 / Number 4, 310-321
D9a: Toshio Yanaki *et al* "Melting behaviour of a Triple Helical Polysaccharide Schizophyllan in Aqueous Solution", Carbohydrate Polymers, 5 (1985) 275-283
D10: Versuchsergebnisse "Erhitzen bei konstantem Volumen"
D11: Versuchsergebnisse "Beispiel 1 der D3 mit ACTIGUM CS6®"
D12: Versuchsergebnisse "Erhitzen bei konstantem Druck".

VII. The rejoinder of the patent proprietor (respondent) of 29 September 2014 included auxiliary requests 1 to 13 as well as a copy of the letter of the patent proprietor of 22 August 2013. Auxiliary requests 1 to 9 corresponded to those already submitted one month before the oral proceedings before the opposition division with said letter of 22 August 2013. Auxiliary request 10 to 13 were new auxiliary requests.

In comparison to claim 1 as granted, the amendments contained in claim 1 of those auxiliary requests are the following:

- insertion of the feature "wherein the β-(1,3)-D-glucan is contained in the initial solution in a concentration of 10g/l to 40g/l," (auxiliary requests 1, 5, 6 and 9)
- insertion of the feature "wherein the step of providing an aqueous β-(1,3)-D-glucan initial solution includes the step of adding a calcium complexing agent to the initial solution" (auxiliary requests 2 and 6 to 9)
- limitation of the range defining the temperature for the heating step to 100 to 160°C (auxiliary requests 3, 5 and 7 to 9).
- limitation of the range defining the pH of the aqueous β-(1,3)-D-glucan initial solution to above 12.3 (auxiliary requests 4, 8 and 9)
- insertion at the end of claim 1 as granted of the feature "mixing the obtained aqueous β-(1,3)-D-glucan containing solution with a precipitation agent in sufficient quantity to precipitate the β-(1,3)-D-glucan" (auxiliary requests 10 and 11)
- insertion of the feature "converting the purified β-(1,3)-D-glucan into the form of a powder by drying β-(1,3)-D-glucan" at the end of the claim (auxiliary request 11)
- limitation of the range defining the temperature for the heating step to 85 to 135°C (auxiliary request 12)
- limitation of the range defining the temperature for the heating step to 100 to 120°C (auxiliary request 13).

VIII. In a communication of the Board in preparation of oral proceedings the Board *inter alia* questioned whether a proper substantiation of the auxiliary requests had been provided, as no argument had been submitted by the respondent on whether or not the amendments contained

in the auxiliary requests could overcome the objection raised in respect of the main request, in particular whether they constitute further distinguishing features over the closest prior art, could lead to a different formulation of the problem and to a different assessment of the obviousness of the solution.

IX. Additional submissions were made by the respondent with letter 25 April 2017, *inter alia*, in respect of the substantiation of the auxiliary requests.

X. The appellant submitted additional documents D13 to D15 with letter of 28 April 2017.

XI. Oral proceedings before the Board took place on 31 May 2017.

XII. As far as relevant to the present decision, the submissions of the appellant can be summarized as follows:

(a) The objection that documents D7 to D12 should be disregarded was belated. Point 8 of the reply to the statement setting out the grounds of appeal which was seen by the respondent as containing an objection to their admittance had been only made in relation to new objections concerning the issue of sufficiency of disclosure. There was therefore no reason to disregard documents D7 to D12.

(b) Documents D13 to D15 confirmed the arguments provided in the statement setting out the grounds of appeal. They had been submitted in response to the questions of the Board in points 9.5 and 9.7 of its communication. Accordingly, they should be admitted into the proceedings.

(c) The patent in suit did not provide sufficient information on how to recover the initial viscosity of the β-(1,3)-D-glucan solution when using the claimed method. Furthermore, the pH and temperature condition lead to a decomposition of the β-(1,3)-D-glucan, as shown by documents D7, D8, D9 and D9a, making it impossible to obtain a purified product. Accordingly, the claimed invention was not disclosed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

(d) In Working Example 1 of D2, the step of adding citric acid to adjust the pH value to 4.9 before filtration corresponded to the addition of a complexing agent as foreseen in paragraphs [0011] and [0018] of the patent in suit. Consequently, a process as described in Working Example 1 of D2 was in accordance with that defined in claim 1 of the contested patent. In addition, Working Example 2 of D2, which described the same process steps as in present claim 1, but a in a different order, should be read in combination with paragraph [0020] of D2 which described the possibility of filtering the solution before acidification. Claim 1 thus lacked novelty over D2. If novelty over D2 was to be acknowledged, the claimed process differed from that prior art only in the use of a heating step.

(e) As regards inventive step, documents D2 and D3 were both concerned with the production of β-(1,3)-D-glucans and therefore represented equivalent alternative closest prior art documents. The problem solved over D2 was the provision of a β-(1,3)-D-glucan solution having a higher viscosity,

for which evaporation of water and therefore a heating treatment according to claim 1 of the main request was obvious as shown in the paragraph bridging pages 281 and 282 of D9a.

(f) The auxiliary requests 1 to 9 had been submitted only one month before the oral proceedings before the opposition division and their admissibility had not been decided upon. All auxiliary requests had been submitted without any indication on how the amendments introduced would modify the argumentation on inventive step. According to the case law those requests should not be considered (T 0217/10) or the amendments should be considered not validly filed (T 1784/14). If the auxiliary requests were admitted, any new argumentation supporting those should not be admitted (T 1621/09).

XIII. As far as relevant to the present decision, the submissions of the respondent can be summarized as follows:

(a) It could be taken from point 8 of the reply to the statement setting out the grounds of appeal that the admissibility of documents D7 to D12 had been contested by the respondent. Those documents had been submitted to support new aspects which were not addressed in the impugned decision. Therefore those documents should not be considered in the appeal proceedings.

(b) Documents D13 to D15 were late filed and were not relevant to the questions raised in points 9.5 and 9.7 of the Board's communication. The issue of whether or not the skilled person would have

combined the teaching of D2 and D3 was not new, but had already been raised by the opposition division. Accordingly, D13 to D15 should not be admitted into the proceedings.

(c) The skilled person knew from the teaching of the contested patent and the common general knowledge in the field what type of reaction conditions would allow him to avoid degradation. The patent in suit, in particular its experimental data, showed that the alkaline treatment allowed to decrease the viscosity and the viscosity was increased again after acidifying and heating the solution. Consequently, the invention of the contested patent was sufficiently disclosed.

(d) In agreement with the reasons for the contested decision, D2 in view of its paragraphs [0020] and [0021] did not directly and unambiguously disclose a filtration step after the alkali treatment. Also the working examples did not disclose that the initial solution having a pH of above 11.0 was filtered. Even if the process of D2 for purifying high viscous β-(1,3)-D-glucans involved alkali treatment and acidification could involve refining, i.e. a filtration step as an option, it did not comprise a heating step of that product per se. The low viscous purified β-(1,3)-D-glucan was meant to be used as a raw material for health food drinks. Only those products containing as an ingredient the low viscous purified β-(1,3)-D-glucan were disclosed to be heated. The claimed method was therefore novel.

(e) Regarding inventive step, D2 which related to a method for refining β-(1,3)-D-glucan, i.e. a method

for purifying β-(1,3)-D-glucan, constituted the closest prior art. There were two differences between the method of claim 1 of the patent in suit and that of D2, i.e. the filtration of the β-(1,3)-D-glucan solution having a pH of above 11.0 and the heating step. The problem solved by the claimed invention over D2 was to provide a process for the preparation of purified β-(1,3)-D-glucans, which provided high production yields and was more cost-efficient than the existing β-(1,3)-D-glucan preparation processes, which process led to purified β-(1,3)-D-glucans having viscosity values similar to those obtained in conventional processes. The claimed method avoided the extreme costs of unnecessary dilution and evaporation of water. That said problem was successfully solved was demonstrated by the example and the comparative example of the patent in suit. In that context the claims had to be construed in the light of the description, i.e. the claimed process provided high viscous solutions, whose concentrations in β-(1,3)-D-glucan were up to 40 g/L. As to whether the claimed method was obvious, D2 aimed at preparing β-(1,3)-D-glucans with low viscosity and therefore taught away from the present invention. Moreover the skilled person would not combine the teaching of D2 with that of D3, since D3 did not relate to the preparation of solutions of β-(1,3)-D-glucans, but aimed solely at providing irreversible gels of those compounds. As to the argument that the heating step of the process of claim 1 would lead to water evaporation and hence to an increase of the β-(1,3)-D-glucan concentration in the solution, the experimental report D12 of the appellant had not followed the steps as provided in claim 1 of the contested patent. Moreover, it was clearly

demonstrated in the patent in suit (e.g. in view of paragraph [0039]) that if one operated the process steps mentioned in claim 1, no evaporation took place, as it was indicated that concentration of the β-(1,3)-D-glucan had been kept unchanged at 35 g/l. In that respect the benefit of the doubt should be given to the patent proprietor. Accordingly, the recovery of the viscosity was not due to evaporation, but to the specificities of the process of claim 1. Thus, claim 1 was inventive over D2.

(f) Auxiliary requests 1 to 9 had been admitted into the proceedings by the opposition division, as was implicit from point 16 of the reasons for the contested decision. Furthermore, the auxiliary requests whose admittance had been questioned only by the Board were self explanatory and strengthen the case of the respondent. The opponent did not question the admittance until after the communication of the Board and therefore its objections were late-filed. Moreover, the discussion during the oral proceedings showed that amendments were called for, i.e. the need to define the concentration of the initial solution of β-(1,3)-D-glucan, for which some auxiliary requests were an appropriate reaction.

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

XV. The respondent requested that the appeal be dismissed, or alternatively that the decision under appeal be set aside and the case be remitted to the department of first instance for further prosecution on the basis of

one of auxiliary requests 1 to 13, all filed with the reply to the statement of grounds of appeal.

Reasons for the Decision

Admittance of documents D7 to D12

1. Documents D7 to D9a and D10 have been submitted in support of the objection that the claimed method is insufficiently disclosed. D7, D8, D9 and D9a are explained to relate to the conditions under which β-(1,3)-D-glucans are hydrolysed and decomposed, whereas D10 is indicated to be an experimental report meant to show that the heating step defined in claim 1 does not lead to an increase of the viscosity. D11 and D12 have been submitted in support of the objection that the claimed method lacks an inventive step. D11 is an experimental report which aims at showing that applying the measures of D3 to the β-(1,3)-D-glucans used in the patent in suit would also lead to an increase of their viscosity. D12 is a further experimental report, the purpose of which is to show that evaporation of water during the heating step of the method of claim 1 would lead to an increase of the viscosity of the (1,3)-D-glucan solution. Hence, submissions based on documents D7 to D12, made with the statement setting out the grounds of appeal, relate to the case under appeal and meet the requirements of Article 12(2) RPBA. According to Article 12(4) RPBA these submissions shall therefore be taken into account by the Board, unless the Board is of the opinion that the situation is such that they should have been presented already before the opposition division.

2. The submissions of the appellant based on those documents all relate to the heating step defined in

claim 1. They serve to elucidate whether the heating conditions taught in the patent in suit lead to a decomposition of the purified β-(1,3)-D-glucan solution or whether the heating step defined in claim 1 leads to an increase of viscosity of the β-(1,3)-D-glucan solution and in the affirmative to which extent. These submissions therefore are all in relation to the feature distinguishing the claimed subject-matter from the closest prior art as determined in the contested decision and the question whether it brings about the technical effect also addressed in the contested decision, as well as its significance in relation to sufficiency of disclosure. Although those submissions could already have been made at the first instance, they supplement the argumentation provided before the first instance and their filing with the statement setting out the grounds of appeal can be seen as a reasonable reaction to the reasons given in the decision under appeal. Consequently, the Board sees no reason to hold inadmissible documents D7 to D12.

Admittance of documents D13 to D15

3. The filing of documents D13 to D15, submitted after the Board's communication, represents an amendment to a party's case pursuant to Article 13(1) RPBA at a very late stage and their admission to the proceedings is subject to the Board's discretion pursuant to Articles 13(1) and 13(3) RPBA. The justification for their late submissions is, according to the appellant, that some questions were raised by the Board in points 9.5 and 9.7 of its communication. Point 9.5 only deals with obviousness of using a heating step as defined in D3 in order to increase the viscosity of the solution obtained in the process of D2, a point already amply addressed in the contested decision, the statement of

grounds of appeal and the reply to it. As to point 9.7 it does not raise new issues, but merely points out that experimental report D11 and D12 did not belong to the state of the art pursuant to Article 54(2) EPC and therefore could only be indicative of whether the claimed measure successfully solved the problem addressed by the parties, but not of whether the claimed measures were obvious to the skilled person having regard to the state of the art. In addition point 9.6 of the communication indicated that it had not been contested by the respondent that evaporation of water which was a possibility encompassed by the wording of claim 1 of the patent in suit would be obvious for the skilled person when it was sought to increase the viscosity of the solution. Accordingly, the issues addressed in the Board's communication did not represent a proper justification for submitting documents D13 to D15 at such a late stage. Therefore, the Board finds it appropriate to exercise its discretion by not admitting documents D13 to D15 into the proceedings (Article 13(1) RPBA).

Sufficiency of disclosure

4. The Board in its communication sent in preparation of oral proceedings gave the preliminary opinion that no case had been made that the subject-matter of the present claims lacked sufficiency of disclosure. In essence, it was indicated that whether or not the claimed process led to a recovering of the initial viscosity of the β-(1,3)-D-glucan solution was irrelevant for the issue of sufficiency of disclosure, but only relevant for the issue of inventive step, as said result was not a feature of claim 1. It was also indicated that D7, D8, D9 and D9a did not demonstrate that the measures recommended in the patent in suit, in

particular in its paragraph [0024], did not enable the skilled person to carry out a process as defined in claim 1. Having regard to the findings of the Board under point 8.4 below there was, however, no need to take a decision in this respect.

Novelty

5. As a preliminary remark, it is noted that the opposition division in the reasons for the contested decision, as well as the parties on appeal in all their submissions referred to D2 as a prior art document. However, the prior art implicitly referred to is D1, which is in the Japanese language and for which a translation in English D2 was submitted with the notice of opposition (see section III above). Accordingly, all submissions with respect of D2 and cited passages thereof are meant to be made in respect of D1 and the corresponding passages in that document. The Board, however, for the sake of simplicity and consistency will also refer to the translation D2 and specific passages thereof, when in fact D1 and its corresponding passages are meant.

5.1 Novelty of claim 1 has been objected in the light of Working Example 1 of D2 (paragraph [0026] and following). However, in this working example the pH of the solution before filtration is of 4.9 (paragraph [0029]), whereas according to operative claim 1 the solution which is filtrated is the so-called aqueous β-(1,3)-D-glucan initial solution whose pH is of above 11.0. The argumentation of the appellant that the step of adding citric acid to adjust the pH value to 4.9 before filtration in Working Example 1 of D2 is considered to merely correspond to the addition of a complexing agent as foreseen in paragraphs [0011] and

[0018] of the patent in suit cannot convince. Operative claim 1 unambiguously defines that the solution to be filtrated is the initial solution whose pH is of above 11.0. It is true that the initial solution having said pH (as defined in claim 1) may contain complexing agents as indicated in paragraph [0011] of the specification. This, however, means that the pH of the initial solution defined in operative claim 1 is the pH of the solution that possibly could contain those complexing agents, and not the pH of the solution before any complexing agent has been added to it, as argued by the appellant. Hence, independently of whether or not citric acid added before filtration in Working Example 1 of D2 is a complexing agent within the meaning of the patent in suit, Working Example 1 of D2 cannot anticipate the method of operative claim 1.

5.2 The appellant also based its objection of lack of novelty on a combination of Working Example 2 of D2 with the general description of D2 arguing that its paragraph [0020] also disclosed the possibility to carry out the addition of the acid after instead of before the filtration step. That objection must fail because none of the passages of D2 referred to by the appellant describes a heating step. Accordingly, regardless of whether or not D2 contains any disclosure for the skilled person to read those passages in combination, this particular objection of lack of novelty as presented by the appellant cannot be persuasive. Should this objection rather be based on Working Example 1 of D2, as was indicated to have been understood by the Board in their communication, the same conclusion would nevertheless be arrived at for the following reasons. Even if the teaching of a document is not confined to the detailed information given in the examples, but embraces the whole

disclosure of that document (decision T 0332/87, reasons Nr 2.2), the general principle consistently applied by the Boards of Appeal for concluding lack of novelty is that there must be a direct and unambiguous disclosure in the state of the art which inevitably leads the skilled person to subject-matter falling within the scope of what is claimed. In the present case, there is no specific disclosure in document D2 that the method of Working Example 1 should be repeated exactly in the same manner, e.g. including the sterilization step at 95 °C (which is an optional step in D2 and can be seen as a heat treatment within the meaning of operative claim 1), with the exception of the acid addition which should be performed after the filtration step. This modification of Working Example 1 of D2 by the appellant can thus only be seen as the result of an ex post facto interpretation of document D2, i.e. an interpretation made with the knowledge of the invention in mind and with the aim of reconstructing on purpose the claimed process (see for example decisions T 0199/00, reason 4.2.1). For this reason, this line of argument of the appellant must be rejected.

5.3 Therefore, the Board has no reason to consider that the subject-matter of claim 1 lacks novelty over D2.

Inventive step

Closest prior art

6. The closest prior art for the purpose of assessing inventive step is that which corresponds to a purpose or effect similar to that of the invention and requires the minimum of structural and functional modifications

(Case Law of the Boards of Appeal of the EPO, 8th edition 2016, I.D.3.1)

6.1 The patent in suit relates to a process for the preparation of purified β-(1,3)-D-glucans, i.e. β-(1,3)-D-glucans which do not contain microbial cells and/or other water-soluble constituents of the fermentation broth obtained in their production by microbial fermentation (claim 1 and paragraphs [0001], [0003], [0005] to [0007]). D3 also proposed by the appellant as starting point for assessing inventive step is not concerned with the purification of β-(1,3)-D-glucans, but rather with obtaining a coherent, uniform, non particulate structure and a substantially uniform pH of β-(1,3)-D-glucan polysaccharide gel (see *e.g.* column 2, lines 13-18). On the contrary, D2 is also concerned with processes for the purification of β-(1,3)-D-glucans as shown in the next sections. Accordingly, the closest prior art and starting point for assessing inventive step is to be selected among those purification processes described in D2 whose disclosure is analysed in the next sections in order to determine the process for purification of β-(1,3)-D-glucans which structurally comes closer to that of operative claim 1.

6.2 The purpose of the invention according to D2 is to transform the high viscosity water-soluble β-D-glucans produced by microorganisms by carrying out high alkali treatment of said β-D-glucans into ones of low viscosity. This facilitates removal of bacterial cells from the β-D-glucans solutions or their spray-drying in order to bring β-D-glucans into powdery state (see paragraph [0012]). Accordingly, claim 1 of D2 defines a method of preparing a culture medium containing a water soluble low viscosity β-D-glucan, characterized in that

alkali or its solution is added to the culture medium containing β-D-glucan as a main ingredient so that its viscosity is reduced. Preferred β-D-glucans are β-(1,3)-D-glucans and β-(1,3)-(1,6)-D-glucans as shown by dependent claims 4 and 5, paragraphs [0010], [0016] to [0018] and all working examples of D2. Other β-D-glucans than β-(1,3)-D-glucans within the meaning of the patent in suit, i.e. also including β-(1,3)-(1,6)-D-glucans are in fact not disclosed.

6.3 According to paragraph [0019], the adjustment of pH values is made depending on the concentration of polysaccharide in the culture medium. In the case of rather high concentrations the pH value achieved by the addition of alkali is 11 or higher, preferably 12 or higher, more preferably 13 or higher, in line with dependent claims 2 and 3 and all working examples, wherein the the pH was adjusted to values of at least 13.4.

6.4 If a reduction of the viscosity of the culture medium by addition of alkali is made in order to facilitate purification of the β-(1,3)-D-glucans, i.e. removal of insoluble substances including bacterial cells, that step is carried out by filtration as disclosed in paragraph [0020] of D2. This filtration step is mirrored in claim 9 of D2, which claim is defined as a refining method of the low viscosity aqueous solution obtained by the methods of the preceding claims, for which D2 provides unmistakable pointers to solutions of β-(1,3)-D-glucans, whose viscosity has been reduced by adjusting the pH value to at least 12.

6.5 It is furthermore undisputed that D2 discloses that the pH of the solution whose viscosity has been reduced by the addition of alkali may be adjusted by the addition

of acid. Relevant passages in D2 in relation to a purification method can be found in dependent claim 11, as well as in paragraph [0020] (first paragraph of page 11) and in paragraph [0021]. The first paragraph of page 11 defines that an "*Acid may be added to the culture medium containing water-soluble β-D-glucan of which viscosity was reduced after alkali treatment or the culture medium containing water-soluble β-D-glucan after refining process such as sterile filtration etc. to conduct neutralization treatment for changing its pH from weak alkaline (pH 10) to acidity (pH 2)*". Considering that the addition of alkali is performed in the first step in order to to reach a pH value of 11 or higher (see point 6.3 above), that sentence cannot be understood to relate to a specific embodiment in which the pH of the initial solution of 10 would be brought to 2 by addition of acid, but clearly means that the addition of an acid to the alkaline solution of reduced viscosity whose pH value is of at least 11 is carried out in order to obtain a pH value in the range of 10 (weak alkaline) to 2 (acidity). This only sensible reading of that paragraph is confirmed by claim 11, which describes the addition of an acid to the aqueous solution obtained by the method of claim 9, i.e. to the solution obtained after removal by filtration of insoluble substances including bacterial cells from the solution of β-(1,3)-D-glucan (see above point 6.4), so as "*to bring said aqueous solution to the pH range from weak alkali to acidity*". An additional confirmation that the pH value may be adjusted to an acidic value after the filtration step is to be found in paragraph [0021], lines 21 to 25 on page 11, according to which the situation is mentioned in which "*the culture medium containing water-soluble high viscosity β-D-glucan changes to the one of lower viscosity by alkali treatment, and its pH value is readjusted to acidity*

(pH 2) after refining process if necessary".
Accordingly, contrary to the opinion of the respondent, D2 discloses that the readjustment of pH by addition of acid may take place after the filtration step, which means that D2 discloses filtration of the alkaline solution of reduced viscosity whose pH value is of at least 11, preferably 12 or more, and more preferably 13 or more.

6.6 Summing up, based on the whole disclosure of D2, in particular claims 11, 9 and 1 to 5, the skilled person understands that D2 discloses a process in which the solution of β-(1,3)-D-glucan whose viscosity has been reduced by addition of alkali to a pH value of 12 or more, undergoes a filtration step to remove insoluble substances including bacterial cells, which filtration step is followed by addition of an acid so as too obtain an acidic solution whose pH value can be as low as 2. This process corresponds to that defined in claim 1 except for that it does not comprise a heating step of the acidified solution to a temperature of 60 to 160 °C as required by operative claim 1.

6.7 In the absence of any indication by the parties of another disclosure for a purification method within the disclosure of D2 which might be considered as a further starting point for assessing inventive step, the Board is satisfied that the process for the preparation of purified β-(1,3)-D-glucan as disclosed in above point 6.6 represents the closest state of the art and starting point for assessing inventive step.

Problem and solution

7. The respondent formulated the technical problem solved by the subject-matter of claim 1 of the main request as

to provide a process for the preparation of purified β-(1,3)-D-glucans, which gives high production yields and is more cost-efficient than the existing β-(1,3)-D-glucan preparation processes, which process leads to purified β-(1,3)-D-glucans having viscosity values similar to those obtained in conventional processes. This formulation of the problem stems from a comparison between the example and the comparative example of the patent in suit, whereby the method used for the comparative example does not comprise any of the steps of adding alkali in order to obtain a pH of above 11.0 for reducing the viscosity of the β-(1,3)-D-glucans solution before filtration, adjusting the pH value after filtration with an acid to a pH value of below 5.0 and heating the acidic β-(1,3)-D-glucan solution to a temperature in the range of 60 to 160 °C. Hence, the the method of purification described in the comparative example and identified by the inventors as "*conventional process*" does not represent the closest prior art identified in above point 6.6, but one which is more remote. However, in accordance with the problem - solution approach, the technical problem has to be identified on the basis of objective criteria, i.e. the problem which can be seen to have been actually solved in the light of the closest prior art, which may be different from the prior art which was at the disposal of the inventor (Case Law, supra, I.D.4.1).

7.1 The respondent further argued that the problem solved over the closest prior art would be the provision of a method to filter undiluted aqueous β-(1,3)-D-glucan solutions while restoring the viscosities of the finally obtained β-(1,3)-D-glucan solution to about the same values as the undiluted solution. This was not demonstrated by appropriate experimental evidence, i.e. by a comparison with a method suitably representing the

closest prior art D2 and which demonstrates a causal link between the heating step and the alleged recovery of the viscosity to about the same value as the original viscosity value, but furthermore lacks credibility as explained below. According to paragraph [0024] of the patent in suit, the lower the temperature is, the longer is the heating time to recover the initial viscosity of the β-(1,3)-D-glucan. Consequently, the method of operative claim 1, which is open to any heating times, i.e. heating times which can be well below those allegedly sufficient according to paragraph [0024] to recover the initial viscosity, cannot be considered to lead to β-(1,3)-D-glucan solutions having high viscosity values, let alone viscosity values which are about the same as those of the undiluted solution.

7.2 Furthermore, the respondent argues on the basis of features for which claim 1 does not provide any explicit or implicit limitation. In particular it has not been shown to comprise features resulting in a limitation with respect to the viscosity values of the obtained purified (1,3)-D-glucan solution or the absence of evaporation of water as a consequence of the heating step. Contrary to the opinion of the respondent, claim 1 cannot be construed in the light of the description, so as to be directed to process which provides high viscous solutions and/or solutions whose concentrations in β-(1,3)-D-glucan are up to 40 g/L and are kept constant during the heating step. There is no necessity to interpret claim 1 as to its viscosity or its content of β-(1,3)-D-glucan, as there is no unambiguity in relation to those features, but rather the absence of definition in that respect. In such situation, limiting features mentioned in the description cannot be read into claim 1, but need to be

inserted, if the corresponding limitation is desired, by way of amendments (see Case Law, supra, II.A.6.3.2 and II.A.6.3.4), provided they satisfy formal requirements such as those of Articles 123(2) and 84 EPC.

7.3 Since the parties did not dispute that the viscosity of the purified β-(1,3)-D-glucan) solution obtained by the claimed method would nevertheless be increased compared to that obtained with the closest prior art, i.e. to an unspecified degree, in contrast to the formulation of the problem proposed by the respondent in the above sections 7 and 7.1, the Board is satisfied that the technical problem successfully solved over the closest prior art is the provision of a method which also leads to an acidic solution of a purified β-(1,3)-D-glucan product (in the sense that insoluble substances including bacterial cells were removed), but whose viscosity has been increased.

7.4 The patent in suit proposes as solution to this problem the method of claim 1, characterized among others by a heating step of the acidic filtrated solution to a temperature in the range of 60 to 160°C.

Obviousness

8. It remains to be decided whether or not the proposed solution to the problem underlying the patent in suit is obvious in view of the state of the art. As submitted by the appellant, the skilled person starting from the method of the closest art and seeking to solve that problem would find it obvious to concentrate the β-(1,3)-D-glucan acidic solution obtained by the method of the closest prior art.

8.1 That a means to increase the viscosity of an aqueous polymer solution is to use a higher concentration of the polymer is already obvious in view of the common general knowledge, especially for β-(1,3)-D-glucan compounds known for their strong thickening properties (see paragraph [0002] of the patent in suit). In addition it is also confirmed in D9a in relation to schizophyllan, i.e. a β-1,3 D glucan with β-1,6-D-glucan branching (page 275, introduction). It is reported in the paragraph bridging pages 281 and 282 of that document that an increase of the concentration of schizophyllan chains (i.e. the randomly coiled schizophyllan chains; page 281, two last lines) increases the chance for schizophyllan chains to meet one another, and hence to form larger aggregates, leading to a viscosity higher than that expected for a rod-like triple helix, and when their concentration exceeds a certain value the aggregates may extend throughout the aqueous solution to form a gel (page 282, lines 4-9). Hence, the skilled person knows that an increase of the viscosity of schizophyllan chains, i.e. β-1,3 D glucan chains with β-1,6-D-glucan branching can be achieved by increasing their concentration, for which an obvious means for the skilled person is to evaporate a part of the solvent, in the present case water. Accordingly, the skilled person starting from the method of the closest prior art would find it obvious to heat the solution obtained with the method of the closest prior art to a temperature suitable for evaporation of water, for example those within the range defined in claim 1, in order to solve the problem formulated in above point 7.3, arriving thereby in an obvious manner at a method which falls within the ambit of claim 1.

8.2 The argument that an increase of viscosity would be obtained also when carrying out the claimed process at constant volume, i.e. in the case where evaporation of water does not take place, cannot change the above conclusion, since claim 1 does not contain any limitation in that respect and therefore covers embodiments allowing evaporation of water, which as indicated above have been shown to lack an inventive step. Under these circumstances, there is no need to investigate whether an embodiment of the claimed method for which no evaporation takes place during the heating step would be non obvious in the light of the prior art.

8.3 Moreover, the argument that D2 aims at preparing β-(1,3)-D-glucans with low viscosity and therefore teaches away from the present invention, must fail because the answer to the question as to what a person skilled in the art would have done in the light of the state of the art depends on the technical result he had set out to achieve (see T 0939/92 (OJ EPO, 1996, 309), reasons Nrs 2.4.2 and 2.5.3). In the present case, the skilled person is merely seeking to increase the viscosity of the purified β-(1,3)-D-glucan obtained in the closest prior art to an unspecified degree, but is not wishing to obtain β-(1,3)-D-glucan solutions having high viscosity values (see point 7.3 above).

8.4 Therefore, the subject-matter of claim 1 of the main request includes methods which are not inventive and therefore does not meet the requirement of Article 56 EPC.

Auxiliary requests

9. Auxiliary request 1 to 9 were submitted before the opposition division and resubmitted with the rejoinder of the respondent. Contrary to the allegation of the respondent, there is nothing in the contested decision or the minutes of the oral proceedings showing that the admissibility of the those auxiliary requests was discussed, let alone decided. There was in fact no need to take this decision, once the rejection of the opposition constituting the main request of the patent proprietor had been decided. This also is confirmed by the statement of the respondent expressed in point 60 of the rejoinder according to which an adapted description would be filed for each of the auxiliary requests upon their admittance into the proceedings. Accordingly, the admittance of auxiliary requests 1 to 9, as well as of additional auxiliary requests 10 to 13 submitted for the first time on appeal needs to be decided.

9.1 It is the established case law of the boards of appeal that the appeal procedure is designed to ensure that the proceedings are as brief and concentrated as possible and ready for decision at the conclusion of oral proceedings, if scheduled. As indicated in the Case Law (*supra*, IV.E.4.2.4), the RPBA taken as a whole make it clear that appeal proceedings are primarily written in nature, an important aim of Article 12 and Article 13 RPBA being that the parties' submissions are concentrated at as early a stage as possible so that the case is as complete as possible when it comes to examining it, oral proceedings being in principle appointed at a point in time when the written submissions of all parties are complete (see decision G 4/95, reasons Nr 4).

9.2 Under Article 12(2) RPBA, it must be set out why it is requested that the decision under appeal be reversed, amended or upheld. In this context, it is not only for the appellant to substantiate its appeal, but equally for the respondent to show at an early stage why it considers that the objections raised in the grounds of appeal do not withstand scrutiny. If auxiliary requests are submitted, reasons usually have to be given to explain how they overcome those objections (at least if this was not obvious from the amendments made)(see Case Law, *supra*, IV.E.4.2.4, citing T 0217/10).

9.3 In the present case the respondent in relation to auxiliary requests 1 to 9 stated in the reply to the statement setting out the grounds of appeal (point 52) that "*a clear description of the support for these amended claims*" had been provided upon their filing before the opposition division. However, no indication as to how the amendments introduced with those auxiliary requests would overcome the various objections for lack of inventive step raised by the appellant was given.

9.4 With respect to auxiliary request 10 and the inclusion in claim 1 of a mixing step the respondent indicated in the reply to the statement setting out the grounds of appeal that "*This step further emphasizes that the product obtained in the heating step is still a glucan solution. The process as such is not disclosed in the cited documents and the combination of documents is not solving the objective technical problem*" (point 55 of the rejoinder). Concerning the inclusion in claim 1 of auxiliary request 11 of the conversion into a form of a powder the respondent stated "*The additional step is further emphasizing that the product obtained in the*

heating step is a solution which can be converted into a powder, as is shown in this request. The additional step is not disclosed in the cited art and it is inventive over the combined references" (point 56 of the rejoinder). Concerning the arguments brought forward in the rejoinder in support of the existence of an inventive step it was indicated for auxiliary request 12 "*This request has a more narrow temperature range that is nowhere disclosed in the cited art. Its inventive step is also confirmed*" (point 57) and for auxiliary requests 13 "*a similar reasoning as for auxiliary request 12 is applicable to confirm novelty and inventive step of this request*" (point 58). Further arguments in support of inventive step were not provided in the reply to the statement setting out the grounds of appeal.

9.5 However, the merits of these auxiliary requests with respect to inventive step could only be considered in a meaningful manner if the reasons presented in support of those auxiliary requests had been stated fully in order for the Board firstly to allow to understand the chain of logic leading the respondent to the conclusion that the amendments submitted overcame the objection raised by the appellant, and secondly to study and evaluate whether the argumentation presented was persuasive. This in the present case did not only require arguments concerning whether those amendments represented further distinguishing features over the closest prior art, could lead to a different formulation of the problem successfully solved and to a different assessment of the obviousness of the claimed solution, but also a clear indication of the pertinent passages of the relevant prior art, i.e. of the closest prior art and the other documents relied on by the respondent in combination thereof, in order to allow

for the Board and the other party to take position with respect to those auxiliary requests. In the present case, no analysis, including references to pertinent passages, of the closest prior art and the additional documents relied upon by the opposing party, was provided concerning the pH or the concentration of the initial solution of β-(1,3)-D-glucan, the obtaining of a product which is still a glucan solution and can be converted into a powder, the ability of the additives used in those prior art documents to fulfill the functional definition of a calcium complexing agent or the functional definition of a precipitation agent and the temperature used during the heating step.

9.6 Hence, the submissions made in respect of auxiliary requests 1 to 13 constituted at most an invitation to the Board and the other party to explore the various diverging approaches proposed by the respondent leaving up to them to guess the assessment made by the respondent of the prior art invoked in respect of those features and its significance on the analysis of inventiveness of the claimed process. Accordingly, the arguments provided in support of inventive step of auxiliary requests 1 to 13 did not constitute a proper substantiation within the meaning of Article 12(2) RPBA.

9.7 In the letter of 25 April 2017, the respondent listed the additional features used with respect to auxiliary requests 1 to 9, 12 and 13. It was stated that "*it goes immediately that a claim to an inventive process which is further limited by an amendment, must be considered inventive; and if one may say so "more" inventive*" (last paragraph on page 4). The letter contained the statement that "*the temperature-range limitation proposed in AR13 is not disclosed in D3 nor in D2 and*

Example demonstrates that by working within this temperature range, the process disclosed thereof produces a purified β-(1,3)-D-glucan (not a gel) having a high viscosity, i.e. close to the initial non-filtered β-(1,3)-D-glucan solution. The concentration range limitation proposed by AR1 is also not disclosed by D2 nor by D3 and Example demonstrates that the process disclosed therein us able to handle such high concentration β-(1,3)-D-glucan solutions to purify and recover their viscosity, i.e. the process is a high yield process. The use of a calcium complexing agent is also not disclosed in D2 nor in D2 and the use thereof improves filtration. The ARs containing combinations of the above mentioned features further define the invention in more precise terms, distancing it even more from the cited prior art". The substantiation for the auxiliary requests provided by the respondent during the oral proceedings did in essence not go beyond that given in the letter of 25 April 2017 and it still did not link the arguments presented to an appropriate analysis of the relevant passages of the prior art, making it not possible for the Board to understand and consider why the various amendments inserted should change the assessment of inventive step with respect to the main request.

9.8 Accordingly, the Board finds it appropriate to make use of the power pursuant to Article 12(4) RPBA by holding auxiliary requests 1 to 13 inadmissible, even in view of the latest submissions of the respondent which do not heal the lack of substantiation of these auxiliary requests, which is contrary to the requirements of Article 12(2) RPBA.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar: The Chairman:

B. ter Heijden D. Semino

Decision electronically authenticated