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Datasheet for the decision of 22 March 2017

Case Number: T 0993/14 - 3.3.01

Application Number: 04740697.0

Publication Number: 1656388

IPC: C07H15/04

Language of the proceedings: EN

Title of invention:
PROCESS FOR PREPARING MALTITOL ENRICHED PRODUCTS

Patent Proprietor:
Cargill, Incorporated

Opponent:
Roquette Frères

Headword:
Maltitol/CARGILL

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

Keyword:
Main request, auxiliary requests 2 to 5: Inventive step - (no), obvious alternatives
Late-filed evidence - admitted (no)
Auxiliary request 1, submitted at the oral proceedings - admitted (no)
Auxiliary request 4, submitted with the statement of grounds of appeal - admitted (yes)

Decisions cited:

Catchword:

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Case Number: T 0993/14 - 3.3.01

D E C I S I O N
of Technical Board of Appeal 3.3.01
of 22 March 2017

Appellant: (Patent Proprietor)	Cargill, Incorporated 15407 McGinty Road West Wayzata, Minnesota 55391 (US)
Representative:	Kiadi Matsuela, Dela Cargill R&D Centre Europe BVBA Bedrijvenlaan 9 2800 Mechelen (BE)
Respondent: (Opponent)	Roquette Frères 62136 Lestrem (FR)
Representative:	Cabinet Plasseraud 66 rue de la Chaussée d'Antin 75440 Paris Cedex 09 (FR)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 28 February 2014 revoking European patent No. 1656388 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	A. Lindner
Members:	G. Seufert
	L. Bühler

Summary of Facts and Submissions

I. The patent proprietor (appellant) lodged an appeal against the decision of the opposition division revoking the European patent No. 1 656 388.

II. The patent as granted consists of eight claims with claim 1 reading as follows:

"1. Process for preparing of maltitol enriched products, and said process is comprising the successive steps:
a) Obtaining syrup (A) containing at least 75%, preferably more than 80% of maltose based on dry substance,
b) Fractionating chromatographically, the process conditions of said fractionation are selected in order to obtain a fraction (B) rich in maltose, comprising at least 92% maltose based on dry substance of fraction (B),
c) Hydrogenating catalytically fraction (B) for obtaining a liquid maltitol enriched product (C),
d) Increasing dry substance of liquid maltitol enriched product (C),
e) Optionally solidifying or crystallizing."

III. The present decision refers to the following documents:

(1) EP 0 905 138
(2) EP 0 905 256
(3) Quan Yi *et al.*, Jingxi Shiyou Huagong (Petrochemie fine), 1990, pages 44 to 48
(5) US 5,141,859
(10) Handbook of Starch Hydrolysis Products and their Derivatives, M. W. Kearsley, S. Z. Dziedzic, Blackie Academic & Professional, London (GB)

1995, pages 30 to 47

(11) Experimental Report, filed by the appellant with the statement of grounds of appeal, three pages

IV. Notice of opposition was filed by the respondent (opponent) requesting revocation of the patent in suit in its entirety on the grounds of lack of novelty and inventive step and insufficiency of disclosure (Article 100(a) and (b) EPC).

V. The decision under appeal was based on a main request (set of claims as granted) and auxiliary requests 1 to 4.

According to the opposition division, the invention underlying the patent in suit was sufficiently disclosed. The subject-matter of the claims as granted was novel over the disclosure of documents (1) and (2), but lacked an inventive step starting with documents (1) or (5) as the closest prior art. The problem to be solved was considered to be the provision of an alternative process for the manufacture of maltitol. The proposed solution, that was the introduction of concentration step d), was considered to be obvious in view of documents (1) to (3) and (5). The same conclusion was reached with regard to auxiliary requests 1, 2 and 4 starting from document (1) as the closest state of the art. The third auxiliary request was held to contravene Article 123(2) EPC.

VI. With the statement of grounds of appeal, the appellant defended the patent in suit on the basis of the claims as granted as its main request, and filed auxiliary requests 1 to 4. It also filed document (11).

Claim 1 of auxiliary request 1 differs from claim 1 of the main request in that the features "**wherein syrup (A) is obtained by liquefying starch milk to a dextrose equivalent of from 2 to 25 for obtaining liquefied starch milk and subjecting said liquefied starch milk to a saccharification step in presence of β-amylase and at least one debranching enzyme selected from the group consisting of pullulanases, iso-amylases and mixtures thereof, and optionally followed by addition of α-amylase for obtaining a syrup (A) containing at least 81% of maltose based on dry substance**" have been added.

This request was subsequently maintained as auxiliary request 5 (see point VIII below).

Claim 1 of auxiliary request 2 differs from claim 1 of auxiliary request 1 filed with the statement of grounds of appeal in that the features "**and wherein a cation exchange resin is used in the chromatographic fractionation step b) and the cation exchange resin is applied in the sodium form**" have been further added.

Claim 1 of auxiliary request 3 contains the additional features of claim 1 of auxiliary requests 1 and 2 (see above). It has been further amended in that fraction (B) in step b) comprises "**more than 96%** maltose and "**wherein the recovery rate of maltose is at least 80%**"

Claim 1 of auxiliary request 4 reads as follows:

"1. Process for preparing of maltitol enriched products, and said process is comprising the successive steps:

a) obtaining syrup (A) containing at least 75%, preferably more than 80% of maltose based on dry substance;
b) fractionating chromatographically, the process conditions of said fractionation are selected in order to obtain a fraction (B) rich in maltose, comprising at least 96%, preferably 98%, maltose based on dry substance of fraction (B);
c) hydrogenating catalytically fraction (B) for obtaining a liquid maltitol enriched product (C);
d) increasing dry substance of liquid maltitol enriched product (C); and
e) optionally solidifying or crystallizing,
wherein syrup (A) is obtained by liquefying starch milk into a liquefied starch milk having a dextrose equivalent of from 2 to 25, the liquefied starch milk is saccharified in the presence of β-amylase, pullulanases and α-amylase for obtaining a maltose syrup (A) containing from 75% to 81% maltose based on dry substance and wherein in step c) the liquid maltitol enriched product (C) obtained is a maltitol syrup (C) containing at least 95% maltitol based on dry substance."

VII. In its reply to the statement of grounds of appeal, the respondent filed several documents, including document (10).

VIII. In the course of the oral proceedings, the appellant filed a new auxiliary request 1, which differed from the previous auxiliary request 1 (see point VI above) in that the addition of α-amylase in the saccharification step has been made mandatory by deleting the term "optionally".

The previous auxiliary request 1 was maintained as auxiliary request 5 (see point VI above).

IX. The appellant's arguments, as far as they relate to the decisive issues of the present decision, can be summarised as follows:

- Admission of document (11)

Document (11) should be admitted into the proceedings. The examples in this document were produced in reply to the findings of the opposition division, in particular in response to discussions at the oral proceedings before the opposition division concerning the enzyme combinations employed in the saccharification step and the advantages associated therewith. The examples also provided evidence for an efficient process for the preparation of three different products with a single process.

- Inventive step (main request)

The closest prior art was document (5). Claim 1 of the main request differed from document (5) in that concentration step d) was present and that the crystallisation step was merely optional.

The problem to be solved, as already indicated in paragraphs [0016], [0035] and [0056] of the patent in suit, was the provision of different grades of maltitol products (i.e. liquid, solid and crystalline, particularly liquid) in high purity with a single process.

Document (5) only taught the production of crystalline or powdered maltitol as finished products, particularly

highly pure crystalline maltitol. Documents (1), (2) or (3) were all directed to the preparation of a crystalline maltitol product. In these documents a concentration step was always followed by crystallisation. None of them provided the skilled person with an incentive to stop after the concentration step to provide liquid maltitol.

- Admission of auxiliary request 1

New auxiliary request 1 was submitted in response to the preceding discussion on inventive step of previous auxiliary request 1, in particular in response to the respondent's observation with regard to the merely optional presence of α-amylase. Furthermore, according to the patent in suit the specific enzyme combination now claimed, including α-amylase, was required for an efficient process (see paragraph [0042] of the patent in suit). Its introduction into claim 1 of the new auxiliary request 1 could therefore not have come as a huge surprise to the respondent.

- Inventive step (auxiliary requests 2 and 3)

According to the patent in suit (see paragraph [0030]), the feature of using a cationic resin allowed maltose in fraction (B) to be obtained in high purity. The question was not whether the skilled person could, but would have used such a step, taking into account that in document (5) the amount of maltose in syrup (A) was 94.5% based on dry substance. The use of the enzyme combination had the additional advantage of shortening the reaction time of the saccharification step as discussed in the context of previous auxiliary request 1. In auxiliary request 3, the maltose content in fraction (B), the recovery value of maltose in

step b), the enzymes in the saccharification step and the resin to be used in step b) were specifically defined. Such a combination of features was not obvious in the light of document (5).

- Admission and inventive step (auxiliary request 4)

This request was a reaction to the opposition division's findings in the decision under appeal and should be admitted. It contained only a single claim, which was based on claim 1 as granted and incorporated the embodiment disclosed on page 10, lines 12 to 22 of the application as filed. The specific combination of features was not obvious in view of the prior art. In particular, the maltose content of syrup (A) was different to document (5). While document (5) aimed at achieving a very high purity before the fractionation step, this was not the case in the presently claimed process. Furthermore, the advantageous enzyme combination according to paragraph [0042] of the patent in suit, including α-amylase, was present, which significantly reduced the reaction time of the saccharification step, as discussed in the context of previous auxiliary request 1.

- Inventive step (auxiliary request 5 = previous auxiliary request 1)

The use of the claimed enzyme combination resulted in a significant reduction of saccharification time. This was apparent when comparing the example of the patent in suit (32 hours) or the disclosure in paragraph [0042] of the patent (somewhat more than 30 hours) with example 13 of document (5) (66 hours). In the process on page 9 of document (5), particular in

lines 46 and 47, only two enzymes were mentioned. There was no disclosure of α-amylase in document (5).

X. The respondent's arguments, as far as they relate to the decisive issues of the present decision, can be summarised as follows:

- Admission of document (11)

Document (11) should not be admitted. There was no justification for its late-filing. The lack of evidence for alleged improvements had already been criticised in the summons to oral proceedings by the opposition division. If not in reply to the notice of opposition, examples showing any improvements should have been filed at the latest in reply to the summons by the opposition division who pointed to the lack of evidence for a technical effect or improvement. Furthermore, example 1 of document (11) did not reproduce the claimed process as a whole. Therefore, it could not demonstrate an overall improvement in reaction efficiency. Moreover, this example showed the same deficiencies as the example of the patent in suit, namely the missing equivalence of the product which was obtained in the saccharification step and the product which was fed to the chromatographic fractionation step.

- Inventive step (main request)

Document (5) was the closest prior art. It was directed to the production of highly pure maltose and its reduction product maltitol. In one of its processes maltose syrup which contained 94.5% of maltose based on dry substance was provided via enzymatic hydrolysis. The maltose product could be further enriched by

chromatographic fractionation resulting in a product with a maltose content of >94.5%. Subsequently, the enriched maltose product was catalytically hydrogenated to obtain highly pure maltitol, which could then be crystallised. The only difference between the process according to claim 1 of the main request and the process disclosed in document (5) was the concentration step d). No unexpected or surprising technical effects associated with the claimed process had been shown.

The problem to be solved was the provision of an alternative process for the preparation of maltitol.

The proposed concentration step, which was the only distinguishing feature, was a common and regularly employed step in the production of maltitol, to be carried out before the crystallisation of maltitol. This was illustrated by documents (1), (2), (3) and (5). Furthermore, the addition of a concentration step before the separation of an end-product was an entirely routine operation for the person skilled in the art.

Claim 1 of the main request included a process whereby the end-product was crystalline maltitol as one alternative. For the finding of lack of inventive step, it was sufficient that this alternative was obvious. Furthermore, document (5) showed that the catalytic hydrogenation initially resulted in a liquid maltitol product (column 15, lines 50 to 57, column 25, lines 24 to 28). The optional crystallisation step could therefore not distinguish the claimed process from the process in document (5).

- Admission of auxiliary request 1

New auxiliary request 1 was not a response to the preceding discussion of the previous auxiliary request 1. In said discussion, it had already been observed that the additional features, in particular the enzyme combination as presently claimed, which included α-amylase as a mandatory feature, was known from document (5). Furthermore, if the mandatory presence of α-amylase was essential for the invention, the appellant could and should have filed a corresponding request at a much earlier stage.

- Inventive step (auxiliary requests 2 and 3)

The additional features in auxiliary request 2, namely the liquefaction and saccharification step, the claimed dextrose equivalents and the enzyme to be used in the saccharification step, were known from document (5). This document also disclosed the use of cationic resins in chromatographic fractionation steps, particularly in their sodium form. The use of cationic resins was also disclosed in each of documents (1), (2) or (3). In the absence of any effect, these features could not support an inventive step.

The same applied to auxiliary request 3, which differed from claim 1 of auxiliary request 2 in that in step b) the amount of maltose in fraction (B) had been amended and the recovery value of maltose had been introduced. These features were commonly known features in the field of maltitol production as apparent from any of documents (1), (2) or (3).

- Admission and inventive step (auxiliary request 4)

This request was late-filed and did not overcome the objections raised in the decision under appeal, in

particular the objection of lack of inventive step. It also raised new issues and required remittal of the case to the opposition division.

The enzyme combination for the saccharification step, including the mandatory presence of α-amylase, was known from document (5) (see column 9, line 32 to column 10, line 15 and column 10, line 31 to 32). The maltose content in document (5) was 94.5% and could be further improved by chromatographic separation (column 10, lines 34 to 39). In this way, the claimed content of 96% was achieved. The transformation of this product into maltitol resulted in an enriched maltitol product of 96%. Moreover, the different amounts of maltose in syrup (A) and fraction (B) and of maltitol in product (C) merely reflected results to be achieved. They were not features which could support an inventive step.

- Inventive step (auxiliary request 5)

The use of the claimed enzyme combination in the saccharification step, including the merely optional presence of α-amylase, was known from document (5) and illustrated in example 13. Speedase PN4 in step 3 of example 13 was a liquefying α-amylase enzyme. No technical effect was associated therewith. The same applied to the claimed dextrose equivalent. In the absence of any effect, these features could not support an inventive step.

XI. The appellant requested that the decision under appeal be set aside and the patent be maintained as granted (main request), or, alternatively, that the patent be maintained on the basis of auxiliary request 1 filed during the oral proceedings of 22 March 2017, or of

auxiliary requests 2 to 4 filed with the statement of grounds of appeal, or of auxiliary request 5 filed as auxiliary request 1 with the statement of grounds of appeal.

XII. The respondent requested that the appeal be dismissed.

XIII. At the end of the oral proceedings, the decision of the board was announced.

Reasons for the Decision

1. The appeal is admissible.

2. Admission of late-filed evidence

2.1 With the statement of grounds of appeal, the appellant submitted an experimental report consisting of examples 1 to 3 (see document (11)). According to the appellant, this evidence was filed in direct response to the decision under appeal, in support of improvements already mentioned in the patent in suit (cf. paragraph [0042]). It did not disadvantage the respondent and had no detrimental effect on the procedural economy.

2.2 Pursuant to Article 12(4) RPBA, the boards shall take into account everything presented by the parties under Article 12(1) RPBA, if and to the extent it relates to the case under appeal and meets the requirements in Article 12(2) RPBA; however, it is within the discretionary power of the board to hold inadmissible evidence which could have been presented in the first-instance proceedings. What needs to be examined is therefore whether the appellant was in a position to

submit its evidence earlier and whether it could have been expected to do so, under the circumstances.

2.2.1 Example 1 of document (11) was provided by the appellant in support of a purported improvement in reaction efficiency. However, whether or not the claimed process resulted in any improvement was already a contentious issue in the first instance proceedings. In its preliminary opinion attached to the summons, the opposition division indicated that no effect directly related to the distinguishing feature was apparent and that the advantages relied on by the patentee (in particular the high recovery yield of highly pure maltitol) were not deducible from the data provided in the examples of the patent in suit. It also indicated that the processes of the prior art appeared to be rather close and that in the discussion of inventive step the parties were expected to focus their attention on the difference between the closest prior art and the invention and the technical effect associated therewith. If improvements were relied on in support of an inventive step, they should be derivable from the original application documents and appropriately substantiated by comparative tests (see point 4 on pages 5 and 6 of the opposition division's communication of 30 September 2013).

Thus, having been made aware of the deficiencies in its assessment of inventive step and having been informed that the data in the patent in suit were insufficient, the appellant, under the circumstances, could and should have filed evidence for any technical effect or improvement on which it intended to rely at that stage of proceedings, unless there were compelling reasons not to do so. No such reasons are apparent to the board and none have been provided by the appellant.

2.2.2 The board also does not agree with the appellant that document (11) was a response to the reasoning of the opposition division in the decision under appeal. In said decision, the opposition division assessed inventive step on the basis of the prior art filed with the notice of opposition, applying the problem-solution approach as indicated in its preliminary opinion. It established the differences and examined the purported technical effects. It did not rely on any new facts or evidence, but confirmed the deficiencies (lack of evidence as to advantages/improvements having their origin in the distinguishing features) in the appellant's arguments concerning inventive step as outlined in the division's preliminary opinion.

2.2.3 Finally, the board judges that example 1 of document (11) cannot be used as evidence of an improvement in reaction efficiency as argued by the appellant. The calculation of a so-called "efficiency factor" over the liquefaction/saccharification step and the fractionation step would require that these steps are carried out consecutively. This was not apparent for example 1 of document (11), particularly, in view of the discrepancies provided with regard to the product obtained in the saccharification step and the feed of the fractionation step (see document (11), first page, last paragraph; second page, first paragraph and table 1, third column).

2.3 For the aforementioned reasons, the board decided not to admit example 1 of document (11) into the proceedings pursuant to Article 12(4) RPBA.

2.4 At the oral proceedings before the board, the decision on the admission of examples 2 and 3 of document (11)

was initially deferred until such time when these examples were taken up by the parties. Since none of the parties relied on them during the discussion of inventive step of all requests, a decision on their admission was not necessary.

Main request

3. Inventive step (Article 100(a) and 56 EPC)

3.1 Claim 1 of the main request is directed to the preparation of maltitol enriched products comprising the steps of a) obtaining a syrup (A) containing at least 75% maltose based on dry substance, b) chromatographically fractionating said syrup to obtain a fraction (B) comprising at least 92% of maltose based on dry substance, c) catalytically hydrogenating fraction (B) to obtain a liquid maltitol enriched product (C) and d) increasing the dry substance of product (C). The solidification or crystallisation step e) is optional. Hence, claim 1 encompasses different process alternatives; one without a crystallisation or solidification step resulting in a liquid maltitol enriched product (C), and one with a solidification or crystallisation step resulting in a solid/crystalline product.

3.2 Similar processes for the preparation of maltitol are already known in the art as illustrated by document (5). This document relates to manufacturing processes for high-purity maltose and its reduction product maltitol in a simple and economical way by sequentially going through the steps of liquefaction of starch, saccharification and reduction (see abstract). One process for the manufacture of high purity maltitol describes the preparation of a product with a maltose

content of not less than 94.5% in the solid part of the liquid (column 10, lines 15 to 18) by liquefaction and saccharification (column 9, line 32 to column 10, line 14). This maltose content falls within the presently claimed range of at least 75% maltose based on dry substance in step a). The maltose can be further purified by chromatographic separation (see column 10, lines 34 to 39). Subsequent hydrogenation, commonly carried out with a catalyst (see column 8, lines 31 to 36), leads to the formation of maltitol or crystallised maltitol (see column 10, lines 40 to 45). A concentration step is not explicitly mentioned in this context.

Thus, the board, in agreement with the opposition division and both parties, considers that document (5) represents the closest prior art and takes it as a starting point for the assessment of inventive step.

3.3 According to the appellant the differences between claim 1 of the main request and document (5) were the additional step of increasing the dry substance of liquid maltitol enriched product (C), in other words a concentration step, and the optional crystallisation/ solidification step. These differences made it possible to produce in a single process liquid, solid and crystalline maltitol in high purity (see also patent in suit paragraphs [0016], [0035] and [0056]). Accordingly, the appellant defined the problem to be solved as the provision of different grades of maltitol products (i.e. liquid, solid and crystalline, particularly liquid) in high purity with a single process.

3.4 The board notes that, according to document (5), the envisaged highly pure maltitol could also be obtained

in liquid, powdered or crystalline form (see column 9, lines 15 to 21 of document (5)). Furthermore, as illustrated in the examples, particularly in examples 1 and 14, catalytic hydrogenation initially results in the formation of a liquid maltitol product, which is subsequently crystallised or solidified (column 14, lines 37 to 41, column 15, lines 52 to 56; column 25, lines 12 to 16 and 24 to 30).

The board therefore fails to see any difference between the maltitol products obtained according to the presently claimed method and those that are obtained in document (5).

3.5 In its statement of grounds of appeal, the appellant also argued that the purpose of the invention was the provision of an overall highly efficient maltitol production. The difference between the claimed process and document (5) was not just the concentration step d) as argued by the opposition division. Rather the whole process needed to be considered, which included the selection of an appropriate dry matter content during liquefaction, an appropriate reaction time for the saccharification step and the good recovery of maltose from the chromatographic fractionation. The appellant also presented calculations of an efficiency factor based on data provided in the examples of the patent in suit and compared it to those calculated for the examples of document (5), based on the assumption of a 100% recovery rate in the suggested chromatographic fractionation step.

3.5.1 At the oral proceedings before the board, the appellant did not rely on any of these points in support of an inventive step of the main request. Moreover, the board concurs with the respondent that none of the allegedly

distinguishing features referred to is present in claim 1 of the main request. With regard to the calculation of the so-called "efficiency factor", the board also concurs with the respondent that the liquefaction/saccharification step and the fractionation step in the example of the patent in suit were not carried out consecutively. It is clearly apparent from the patent in suit that the product of the former is not identical with the starting material (feed) of the latter (cf. page 6, lines 35 to 40 and lines 44 to 45). No "overall" efficiency factor can therefore be calculated for these steps, let alone one for the claimed process as a whole, and no comparison with document (5) can be made. For this reason alone, the appellant's calculations are irrelevant.

3.6 In view of the above, the board, in accordance with the opposition division and the respondent, defines the problem to be solved as the provision of a further process for the production of maltitol enriched products.

The board has no doubts that this problem is solved by the claimed process.

3.7 It then remains to be assessed whether the proposed solution, that is essentially the addition of a concentration step d) after the hydrogenation step, is obvious to the skilled person in view of the prior art.

In the board's judgement, the concentration of a solution to obtain an end-product which is as concentrated as possible or desired, or to stimulate and assist crystallisation is an entirely common and obvious measure for any skilled person. Furthermore, such a step is also described in document (5) (see

column 9, lines 15 to 21, column 15, lines 52 to 57 in example 1 and column 25, lines 24 to 28 in example 14). The routine use of such a concentration step in the production of crystalline maltitol is further confirmed by document (1) (see page 6, lines 14, 21 and 29), document (2) (see page 6, lines 14 and 22) and document (3) (see page 5, last paragraph). The addition of such a step to the process described in columns 9 and 10 of document (5) would therefore have been considered as an entirely obvious measure by the person skilled in the art, particularly if the production of crystallised maltitol as disclosed in column 10, lines 40 to 42 is desired. No inventive ingenuity is required.

3.8 According to the appellant the main goal in documents (1) to (3) and (5) was to obtain maltitol in crystalline form. The concentration step was therefore always followed by a crystallisation step. In contrast, the presently claimed process made it possible to obtain maltitol in liquid form. No incentive could be derived from any of the prior documents to stop after the concentration step.

3.9 The board does not agree. As explained in point 3.1 above, the preparation of crystalline maltitol is encompassed in the scope of claim 1 of the main request as a potential alternative. It is sufficient that this alternative is obvious in the light of the prior art to come to the conclusion that claim 1 lacks an inventive step. For this reason, the appellant's arguments cannot succeed.

3.10 Hence, the board concludes that the subject-matter of claim 1 of the main request does not involve an inventive step, contrary to Article 56 EPC.

Auxiliary request 1

4. Admission into the proceedings

4.1 At the oral proceedings before the board, during the discussion of inventive step of auxiliary request 1 filed with the statement of grounds of appeal, the appellant submitted a new auxiliary request 1, in which the addition of α-amylase in the saccharification step was made obligatory. It justified the late filing with the preceding discussion on the previous auxiliary request 1.

4.2 The board notes that neither the respondent nor the board had raised any new objections against the previous auxiliary request 1 in the preceding discussion. It was the appellant who, in this context, relied on the presence of α-amylase (i.e. a merely optional feature) as a distinguishing feature and on a technical effect allegedly associated therewith. If, as argued by the appellant, the presence of α-amylase is essential for the invention, the appellant could and should have filed a corresponding request at a much earlier stage in the proceedings. In addition, the board notes that the respondent had already pointed out that the additional presence of α-amylase was also disclosed in document (5). The board therefore fails to see how making the addition of α-amylase mandatory in claim 1 of the newly submitted auxiliary request 1 replies to the respondent's objection. The appellant's argument that the filing of this request was a timely and appropriate reaction to the course of the oral proceedings is therefore not accepted.

4.3 Hence, the board, making use of its discretionary power pursuant to Article 13(1) RPBA, decided not to admit auxiliary request 1.

Auxiliary request 2

5. Inventive step (Article 100(a) and 56 EPC)

5.1 Claim 1 of auxiliary request 2 differs from claim 1 of the main request in that the syrup (A) in step a) contains at least 81% of maltose and is obtained by liquefying starch milk to a dextrose equivalent of 2 to 25 and subjecting the liquefied product to a saccharification step in the presence of β-amylase and pullulanase or iso-amylase, optionally followed by the addition of α-amylase. In addition, a cation exchange resin in sodium form is used in the fractionation step b).

5.2 The board concurs with the respondent, that no advantages or improvements have been shown for the claimed process. The problem to be solved remains therefore the same as formulated in point 3.6 above.

5.3 The use of β-amylase and pullulanase or iso-amylase in the saccharification step is already known from document (5) (see column 9, lines 43 to 63) and the subsequent treatment with α-amylase (i.e. maltogenic α-amylase) is also disclosed in this context (see column 9, lines 64 to 65). Furthermore, document (5) mentions in column 10, lines 3 to 8, the use of a liquefying enzyme (i.e. α-amylase, see column 10, lines 31 to 32). The use of β-amylase, pullulanase and α-amylase in the saccharification step is also illustrated in examples 1 and 13, where speedase PN4 - a liquefying α-amylase - is used in the saccharification step. The dextrose

equivalent of 2 to 25 for the liquefied starch milk reflects commonly obtainable and preferred values, as confirmed by document (3) (see pages 2 and 3, point 2 and table 1) and document (10) (see page 42, last line to page 43, penultimate paragraph), which both reflect common general knowledge of the person skilled in the art in the field of maltose and maltitol production. Such dextrose equivalent values are also preferred in document (5) (see examples, including examples 1 and 13, which refer to dextrose equivalents of 12 and 6.5).

5.4 Document (5) also teaches the use of cation resins in sodium form in the chromatographic separation step (see column 8, lines 52 to 63). The common use of such resins in chromatographic fractionation for the purification of maltose is furthermore confirmed by document (3) (see page 4, point (4), entitled "adsorption par résine échangeuse d'ions").

5.5 It follows from the above that all the additional features of claim 1 of auxiliary request 2 are already taught in document (5) or are part of the skilled person's common general knowledge. Their selection has not been shown to result in a particular technical effect and is therefore neither critical nor purposive. It is merely an arbitrary selection of no technical significance, made within the ambit of document (5). Such a selection does not require any inventive ingenuity. The claimed subject-matter is therefore obvious in view of document (5) alone or in combination with common general knowledge.

5.6 The appellant's argument that the skilled person could, but would not have combined these features, in other words that there was no pointer for the combination,

cannot succeed. In the present case, where the technical problem is merely the provision of an alternative method for the preparation of maltitol and where the solution merely consists in arbitrarily selecting features within the ambit of document (5), no specific incentive or pointer for the selection is required. Indeed, in the board's judgement, any combination of features from document (5) not associated with an unexpected or surprising effect would be equally obvious.

5.7 The appellant also argued that the additional features in claim 1 of auxiliary request 2 allowed the production of maltitol in high purity. In this context, it referred to paragraph [0030] of the patent in suit in support of an inventive step.

This paragraph mentions the selection of the conditions of the chromatographic fractionation such that fraction (B) comprises at least 92%, particularly more than 96% maltose based on dry substance. However, according to document (5) the content of maltose after the liquefaction and saccharification is 94.5% based on dry substance, which can be further improved by chromatographic separation (see column 10, line 15 to 39). Hence, the purity of the maltose product according to document (5) (i.e. > 94.5%) is even higher than the purity of the maltose product in fraction (B) of the presently claimed process. The claimed purity cannot therefore be considered as a contribution to the prior art in support of an inventive step.

5.8 The appellant's argument with regard to a significant reduction in the reaction time of the saccharification step as a consequence of the use of a particular enzyme

combination (i.e. β-amylase, pullulanase and α-amylase) is not accepted for the following reasons:

Firstly, the board notes that α-amylase is merely an optional feature of claim 1 of auxiliary request 2. Furthermore, even assuming, in favour of the appellant, that the presence of α-amylase was mandatory, such an enzyme combination is also present in example 13 of document (5) (i.e. β-amylase, promozyme TM200L = pullulanase and speedase PN4 = α-amylase). The reduction in reaction time observed by comparing the example of the patent in suit or the disclosure in paragraph [0042] with example 13 of document (5) cannot therefore be attributed to any alleged difference in the enzyme combination, but must have its origin in other features, which are not reflected in claim 1 of the auxiliary request 2.

5.9 For the aforementioned reasons the board concludes that the subject-matter of claim 1 of auxiliary request 2 does not involve an inventive step (Article 56 EPC).

Auxiliary request 3

6. Inventive step (Article 100(a) and 56 EPC)

6.1 Claim 1 of auxiliary request 3 differs from claim 1 of auxiliary request 2 merely in the desired result of the fractionation step b) (i.e. the maltose enriched fraction (B) comprises more than 96% maltose and the recovery is at least 80%).

6.2 Document (5) is still the closest state of the art and the problem to be solved remains the same as formulated in point 3.6 above.

6.3 The board re-emphasises that a chromatographic fractionation step for the purification of maltose is already disclosed in document (5). Furthermore, the board notes that purity and recovery of a product of a chromatographic fractionation step are the result of appropriately selected process conditions, such as the type of resin to be used, column dimension, flow rate, sampling and selection of appropriate fractions, etc. The type of resin to be used is known from document (5) (see column 8, lines 56 to 62). Adjusting conditions such as flow rate, column dimension, sampling, etc. in such a way as to recover a high percentage of the desired product in high purity, as presently claimed, belongs to the routine task of the person skilled in the art. No inventive ingenuity is required.

In this context, the board also notes that it is not apparent from the patent in suit that the claimed purity or recovery values require any unusual measures beyond the normal skills and routine activity of a person skilled in the art. It is also apparent from document (3) that the presently claimed purity and recovery values are not uncommon for chromatographic fractionation of maltose (see page 4, point (4), last two lines: at least 94% maltose and 93% recovery).

6.4 Hence, the board concludes that the subject-matter of auxiliary request 3 lack inventive step (Article 56 EPC).

Auxiliary request 4

7. Admission of auxiliary request 4

7.1 Auxiliary request 4 was filed with the statement of grounds of appeal. Contrary to the respondent, the

board judges that auxiliary request 4 does not raise complex new issues or create a fresh case, thereby rendering the decision under appeal obsolete and requiring the board to conduct the case completely anew or to remit it to the opposition division. The submission of auxiliary request 4, which has been filed without delay at the earliest possible stage in the appeal proceedings, is considered as a legitimate attempt of the appellant to defend the patent in suit.

7.2 The board therefore decided to admit auxiliary request 4 into the proceedings.

8. Inventive step (Article 100(a) and 56 EPC)

8.1 Claim 1 of auxiliary request 4 differs from claim 1 of the main request i) in that the syrup (A) contains from 75 to 81% maltose and is obtained by liquefying starch milk to a dextrose equivalent of 2 to 25 and subjecting the liquefied product to a saccharification step in the presence of β-amylase, pullulanase and α-amylase, ii) in that in step b) the maltose enriched fraction (B) comprises at least 96% maltose and iii) in that in step c) the liquid maltitol enriched product (C) contains at least 95% maltitol.

8.2 Document (5) is still the closest state of the art and the problem to be solved remains the same as formulated in point 3.6 above.

8.3 As explained in point 5.3 above, the claimed dextrose equivalents reflect commonly obtainable and preferred values, which are also preferred in document (5). The combined use of β-amylase, pullulanase and α-amylase is also taught in document (5) (see point 5.3. above). The selection of these features does not require any

inventive skills for the same reasons as explained in points 5.5. and 5.8 above).

8.4 In document (5), the maltose syrup (A), although already highly pure (94.5%), can be further purified by chromatographic fractionation. The purity of such a product is not explicitly disclosed. However, as explained in point 6.3 above, and in the absence of any evidence to the contrary, the board is convinced that appropriately adjusting the chromatographic conditions to obtain a fraction (B) with the claimed maltose content of at least 96% is a routine task for the person skilled in the art and requires no inventive skills. This does not change in a situation where, as presently claimed, the maltose syrup (A) contains 75% to 81% instead of 94.5% maltose. In this context, reference is made to document (3), which shows that highly enriched maltose (more than 94%) can be obtained when a maltose syrup with a maltose content of 70% is subjected to chromatographic fractionation (see page 4, point (4)).

The purity of the maltitol product is the result of the purity of the maltose product (see for examples, document (5), examples 1, results for maltose and maltitol in steps 3 and 4; example 13, results for maltose in step 3 and example 14, results for maltitol). It is also known from document (3) that under appropriate conditions (e.g. temperature and pressure), maltose is almost entirely transformed into maltitol (see document (3), page 5, first paragraph under the reaction scheme). It follows that the presently claimed purity of maltitol product (C) containing at least 95% can also routinely be obtained by the person skilled in the art.

In summary, neither the maltose content of syrup (A), nor the amount of maltose in fraction (B), nor the amount of maltitol in product (C) - all of which can be routinely obtained - can support an inventive step.

8.5 For the aforementioned reasons, auxiliary request 4 is rejected for lack of inventive step of the subject-matter of claim 1.

Auxiliary request 5 (previous auxiliary request 1)

9. Inventive step (Article 100(a) and 56 EPC)

9.1 Claim 1 of auxiliary request 5 is identical to claim 1 of auxiliary request 2, except that no resin to be used in the chromatographic fraction step b) is defined (see point 5.1 above).

9.2 The absence of this feature has no influence on the assessment of inventive step as set out in point 5 above. Hence, the same observations and the same conclusion as in points 5.3 and 5.5 to 5.9 apply also to claim 1 of auxiliary request 5, with the consequence that auxiliary request 5 must also be rejected for lack of inventive step of the subject-matter of claim 1.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

M. Schalow A. Lindner

Decision electronically authenticated