BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

Internal distribution code:
(A) [ ] Publication in OJ
(B) [ ] To Chairmen and Members
(C) [X] To Chairmen
(D) [ ] No distribution

Datasheet for the decision of 19 July 2006

Case Number: T 0279/03 - 3.3.09

Application Number: 97306893.5

Publication Number: 0827698

IPC: A23J 3/16

Language of the proceedings: EN

Title of invention:
Aglucone isoflavone enriched vegetable protein extract and protein material, and high genistein and daidzein content materials and process for producing the same

Patentee:
Archer Daniels Midland Company

Opponent:
Archer Daniels Midland Company (opposition withdrawn)

Headword:
-

Relevant legal provisions:
EPC Art. 56

Keyword:
"Inventive step (yes) - after amendment"

Decisions cited:
-

Catchword:
-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0279/03 - 3.3.09

D E C I S I O N
of the Technical Board of Appeal 3.3.09
of 19 July 2006

Appellant: (Patent Proprietor)
Archer Daniels Midland Company
4666 East Faries Parkway
Decatur, IL 62526 (US)

Representative:
Tubby, David George
Marks & Clerk
90 Long Acre
London WC2E 9RA (GB)

Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 23 December 2002 revoking European patent No. 0827698 pursuant to Article 102(1) EPC.

Composition of the Board:

Chairman: P. Kitzmantel
Members: A. T. Liu
K. Garnett

Summary of Facts and Submissions

I. A notice of opposition was filed against European Patent No. 827 698 under Article 100(a), based on the grounds of lack of novelty and lack of inventive step, as well as under Articles 100(b) and (c) EPC.

II. Of the prior art documents cited in the course of the opposition proceedings, reference will be made to the following in the present decision:

D2: WO 95/10530
D4: EP-A-426 998
D6: Barnes et al., J. Agric. Food Chem. 42, 2466 to 2474 (1994).

III. During the oral proceedings on 19 November 2002, the patentee filed an amended set of claims as the basis for an auxiliary request.

IV. At the conclusion of the oral proceedings, the opposition division decided to revoke the patent in suit. Essentially, it was held that the subject-matter of Claim 1 as granted did not meet the requirements of Article 123(2) EPC. Furthermore, the subject-matter of Claim 1 according to the auxiliary request was found to lack an inventive step in view of the disclosure of D2.

V. Notice of appeal against the decision of the opposition division, dispatched in written form on 23 December 2002, was filed by the patentee on 24 February 2003. With the Statement of the Grounds of Appeal dated 1 May 2003, the appellant indicated that the claims referred

to in the impugned decision as the Auxiliary request were maintained as the basis for its new main request.

VI. By letter dated 22 March 2004, the respondent indicated the reasons as to why the claimed subject-matter would be obvious in view of D2 in combination with either D4 or D6. By letter of 18 August 2005, the respondent withdrew the opposition against the patent.

VII. In an annex to the summons to oral proceedings, the board acknowledged the withdrawal of the opposition. However, it also pointed out that the arguments submitted by the then-respondent in its afore-mentioned letter appeared to corroborate the opposition division's finding of lack of inventive step.

VIII. At the oral proceedings on 19 July 2006, the appellant filed a new set of 48 claims as the basis for a new main request, relinquishing the request previously submitted with the Statement of the Grounds of Appeal.

IX. The independent claims of the sole request on file read as follows:

"1. A process for producing an aglucone isoflavone enriched extract from a vegetable material comprising:

extracting a vegetable material containing isoflavone conjugates and protein with an aqueous extractant having a pH above about the isoelectric point of said protein in said vegetable material;

in a first conversion step, treating said aqueous extract at a temperature of from 2°C to 121°C and

a pH of from 9 to 11 for sufficient time to convert from 80% to 100% of said isoflavone conjugates to isoflavone glucosides; and

in a second conversion step, adding an effective amount of a supplemental enzyme capable of cleaving glucoside bonds with said isoflavone glucosides in said aqueous extract at a temperature of from 5°C to 75°C and a pH of from 3 to 9 for sufficient time to convert said isoflavone glucosides to aglucone isoflavones.

13. A process for producing an aglucone isoflavone enriched protein material from a vegetable material comprising:

extracting a vegetable material containing isoflavone conjugates and protein with an aqueous extractant having a pH above about the isoelectric point of said protein in said vegetable material;

in a first conversion step, treating said aqueous extract at a temperature of from 2°C to 121°C and a pH of from 9 to 11 for sufficient time to convert from 80% to 100% of said isoflavone conjugates to isoflavone glucosides;

separating a protein material containing said isoflavone glucosides from said aqueous extract; and

in a second conversion step, contacting said isoflavone glucosides in said protein material with an enzyme capable of cleaving glucoside bonds

at a temperature of from 5°C to 75°C and a pH a from 3 to 9 for sufficient time to convert said isoflavone glucosides to aglucone isoflavones, wherein contacting with enzyme comprises adding an effective amount of supplemental enzyme to said protein material.

24. A process for producing an aglucone isoflavone enriched protein material from a vegetable material, comprising:

extracting a vegetable material containing isoflavone conjugates and protein with an aqueous extractant having a pH above about the isoelectric point of said protein in said vegetable material;

separating a protein material containing said isoflavone conjugates from said extract;

forming an aqueous slurry of said protein material;

in a first conversion step, treating said aqueous slurry at a temperature of from 2°C to 121°C and a pH of from 9 to 11 for a period of time sufficient to convert from 80% to 100% of said isoflavone conjugates to isoflavone glucosides; and

in a second conversion step, contacting said isoflavone glucosides in said aqueous slurry with an enzyme capable of cleaving glucoside bonds at a temperature of from 5°C to 75°C and a pH of from 3 to 9 for sufficient time to convert said isoflavone glucosides to aglucone isoflavones, wherein contacting said glucosides with an enzyme

comprises adding an effective amount of a supplemental enzyme to said slurry."

X. The appellant's arguments were as follows:

- With respect to the closest prior art according to D2, the technical problem to be solved was to improve the conversion rate of the isoflavones to isoflavone aglucones.

- The solution to this technical problem, as proposed in the independent claims, was to first convert at least 80% of the isoflavone conjugates to the corresponding glucosides before adding a supplemental enzyme to convert the glucosides to aglucones.

- The examples in the patent in suit were evidence that the technical problem was solved with the claimed processes, which included such a two-step conversion.

- The skilled person could not gather from any of the available prior art documents the information that the incorporation of the first conversion step prior to the addition of enzyme would lead to an improvement of the process of D2.

- D4 was directed to a process for obtaining isoflavone conjugates from soy beans. D6 also concerned the isolation of isoflavone conjugates from soy products and their identification by HPLC-mass spectrometry. These documents were therefore

irrelevant with regard to the present technical problem.

XI. The appellant (patentee) requested that the decision under appeal be set aside and that the patent be maintained on the basis of the main request filed during the oral proceedings.

Reasons for the Decision

1. Amendment

1.1 Present independent Claims 1, 13 and 24 essentially correspond to Claims 1, 14 and 26 as originally filed and as granted, with the difference that the pH range of from "6 to 13.5" for the first conversion step is amended to the range of from "9 to 11". Further, they contain the additional stipulations that (i) the treatment in the first step is to convert "80% to 100%" of the isoflavone conjugates and (ii) supplemental enzyme is added after that first conversion step.

These amendments are based on the description, page 8, lines 29 to 30; page 9, lines 25 to 25; and Claim 5 as originally filed (or the corresponding original Claims 18 or 31). Clearly, these amendments restrict the scope of the present claims with respect to that of the granted claims.

The dependent Claims 2 to 12, 14 to 23 and 25 to 48 essentially correspond to Claims 2 to 4, 6 to 13, 15 to 17, 19 to 25, 27 to 30, and 32 to 51 as originally filed and as granted.

The present claims therefore comply with the requirements of Article 123(2) and (3) EPC.

2. Sufficiency of disclosure

The objection under Article 100(b) EPC was not pursued during the appeal proceedings. The board therefore has no reason to query the finding of the opposition division that the requirements of Article 83 are met by the patent in suit (see decision under appeal, item 4.2).

3. Novelty

Novelty is not an issue for the claims according to this request. The reasons for this will be clear from the following discussion of inventive step.

4. Inventive step, Article 56 EPC

4.1 Closest prior art

It is common ground that D2 comprises the closest prior art teaching, being also directed to a process for producing an aglucone isoflavone enriched vegetable protein extract. In this process, the desired product is obtained by reacting a vegetable protein extract with at least one of a beta-glucosidase or esterase enzyme to convert the majority of isoflavones present in the extract to aglucone isoflavones (page 3, lines 4 to 22 and Claim 1).

4.2 Problem / Solution

The board accepts the appellant's submission and considers that the technical problem to be solved with regard to D2 is to improve the conversion rate to aglucone, in terms of the reaction time and the aglucone yield.

The solution to the indicated technical problem is characterised in that, prior to its being contacted with supplemental enzyme, the extract is first treated at a pH ranging from 9 to 11 for sufficient time to convert at least 80% of the isoflavone conjugates present in the extract to isoflavone glucosides (Claims 1, 13 and 24).

The various examples reported in Tables 1 and 2 of the patent in suit show that the overall conversion rate to aglucone can indeed be increased when the isoflavone conjugates in the extract are first converted to glucosides, before the glucoside bond is cleaved by enzymatic action. It can therefore be accepted that the technical problem is solved by the process of Claims 1, 13 and 24.

4.3 Obviousness

It is not in dispute that D2 only teaches a one-step reaction process in which the isoflavones in the extract are contacted with an enzyme, the assumption in D2 being that the glusoside bond of both types of isoflavones, ie the conjugates (isoflavone glucosides esterified at the glucose moiety) and the glucosides (having an unsubstituted glucose moiety), are similarly

cleaved by the enzyme, converting both these isoflavone varieties into the corresponding aglucones (see page 6, lines 15 to 27). There is no mention in this document, explicit or implicit, that a base catalysed de-esterification of the conjugates prior to cleaving the glucoside bond on contact with an appropriate enzyme would lead to an improvement of the conversion to aglucone. The speculation of the opposition division in the decision under appeal is at variance with the data contained in tables 1 and 2 of D2, which only show that under favourable pH and temperature conditions conjugates as well as glucosides can effectively be converted to aglucones, without one being able to infer that the aglucone yield is in any way linked to a prior de-esterification of the conjugates. Nor can the skilled person obtain this information from any other piece of prior art on file.

As is correctly pointed out by the appellant, both D4 (abstract and Claims 1 and 4) and D6 (Summary; paragraph bridging pages 2469 and 2470; page 2473, left-hand column, first full paragraph) explain that isoflavone conjugates can be hydrolytically decomposed to glucosides under basic conditions (D4) or heat (D6). To the skilled person this piece of information is, however, trivial and does not go beyond basic chemical knowledge.

The decisive point in the present context is rather, whether the skilled person had any incentive for incorporating a base catalysed conversion step into the process of D2 with the aim of improving the conversion to aglucone.

In D4, the reaction of the conjugates in an alkaline medium is only discussed in the context of identification tests on the conjugates, the conclusion being that genistin malonate is **decomposed** (emphasis added) in the presence of sodium hydroxide (see in particular page 7, lines 1 to 2). Likewise, the hydrolysis of the conjugates is discussed in D6 in the context of their identification by HPLC-mass spectrometry.

In view of these prior art teachings, the above question has to be answered in the negative. In consequence, each of the processes of Claims 1, 13 and 24 cannot result from an obvious combination of D2 with one of the cited prior art documents, including D4 and D6. The claimed processes therefore involve an inventive step.

Claims 2 to 12, Claims 14 to 23, and Claims 25 to 48 are preferred embodiments of the processes according to Claims 1, 13 and/or 24. Their subject-matter therefore is also new and involves an inventive step.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the opposition division with the order to maintain the patent on the basis of Claims 1 to 48 of the main request filed during the oral proceedings after any necessary consequential amendment of the description.

The Registrar: The Chairman:

G. Nachtigall P. Kitzmantel