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**D E C I S I O N**  
**of 22 March 2001**

**Case Number:** T 1164/97 - 3.3.2

**Application Number:** 88105223.7

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**IPC:** A23L 1/28

**Language of the proceedings:** EN

**Title of invention:**  
Mushroom flavour

**Patentee:**  
SOCIETE DES PRODUITS NESTLÉ S.A.

**Opponent:**  
CPC Maizena GmbH

**Headword:**  
Mushroom flavour/NESTLÉ

**Relevant legal provisions:**  
EPC Art. 52(1), 54, 56, 64(2), 123(2), (3)

**Keyword:**  
"Broadest claim in each request directed to a product solely defined in terms of the process for its production; product not inventive"

**Decisions cited:**  
T 0020/81, T 0248/85, T 0411/89

**Catchword:**  
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Case Number: T 1164/97 - 3.3.2

**D E C I S I O N**  
**of the Technical Board of Appeal 3.3.2**  
**of 22 March 2001**

**Appellant:** SOCIÉTÉ DES PRODUITS NESTLÉ  
(Proprietor of the patent) Case postale 353  
1800 Vevey (CH)

**Representative:** Andrae, Steffen, Dr.  
Andrae Flach Haug  
Balanstrasse 55  
D-81541 München (DE)

**Respondent:** CPC Maizena GmbH  
(Opponent) Knorrstrasse 1  
D-74074 Heilbronn (DE)

**Representative:** Lederer, Franz, Dr.  
Lederer, Keller & Riederer  
Patentanwälte  
Prinzregentenstrasse 16  
D-80538 München (DE)

**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 14 November 1997  
revoking European patent No. 0 288 773 pursuant  
to Article 102(1) EPC.

**Composition of the Board:**

**Chairman:** C. Germinario  
**Members:** G. F. E. Rampold  
C. Rennie-Smith

## Summary of Facts and Submissions

- I. The appellant is proprietor of European patent No. 0 288 773 (application No. 88 105 223.7). The respondent originally filed a notice of opposition to the grant of the patent requesting its revocation as a whole pursuant to Article 100(a) and (b) EPC on the grounds of lack of novelty and inventive step and insufficiency of disclosure.
- II. The following citations submitted in support of the opposition remain relevant to the present appeal:
- (1) M. Wurzenberger et al, "The Enzymic Oxidative Breakdown of Linoleic Acid in Mushrooms (*Psalliotta bispora*)", Zeitschrift für Lebensmittel-Untersuchung und -Forschung **175**, pages 186 to 190, 1982;
  - (3) M. Wurzenberger et al, "Bestimmung von 1-Octen-3-ol in Pilzen und Pilzprodukten", Zeitschrift für Lebensmittel-Untersuchung und -Forschung **176**, pages 16 to 19, 1983;
  - (4) R. Tressl et al, "Formation of Eight-Carbon and Ten-Carbon Components in Mushrooms (*Agaricus campestris*)", J. Agric. Food Chem., 30, pages 89 to 93, 1982
- III. The patent was revoked pursuant to Article 102(1) EPC by a decision of the opposition division posted on 14 November 1997. The ground for the revocation was lack of inventive step of the patent in the form as amended in the course of the opposition proceedings.

The essence of the reasoning in the opposition division's decision was as follows:

Although Article 100(b) EPC had been invoked by the respondent (opponent) as a ground for opposition, the notice of opposition did not contain any indication of the facts, evidence or arguments related to the ground of insufficiency of disclosure. Moreover, neither did the opponent maintain the opposition under Article 100(b) EPC during the oral proceedings, nor did the opposition division see any sound reason for calling into question the sufficiency of disclosure of the invention and for further pursuing this issue on its own motion under Article 114(1) EPC.

As to the grounds of opposition laid down in Article 100(a) EPC, the opposition division acknowledged the novelty of the claimed process on the basis that claim 1 as amended required vis-à-vis the state of the art cited in the opposition proceedings the additional use of certain additives in the production of the claimed mushroom flavourant.

As to inventive step, the opposition division held that it was within the ordinary skill and ability of one skilled in the art to adapt the teaching of either of the citations (1) and (3) for the commercial and industrial production of a mushroom flavourant for foodstuffs. It held further that the allegedly improved yield of 1-octen-3-ol obtained by the claimed process had never been proven by the submission of appropriate evidence and found that, if a higher yield was nevertheless achieved, as contended by the proprietor of the patent, such improvement was due, according to the proprietor's own submission, to technical features

which were not specified in the claims.

Finally, the opposition division did not recognise any unexpected advantage or difference in the reaction mechanism as the result of using a water-soluble salt of linoleic acid as the precursor rather than the free acid.

- IV. The proprietor of the patent lodged an appeal against this decision and requested oral proceedings. In addition to the appellant's main request that the patent be maintained in amended form in the version on which the impugned decision was based, it filed together with the statement setting out the grounds of appeal auxiliary requests 1 to 3 which, when the appellant filed a new first auxiliary request during the oral proceedings, were renumbered auxiliary requests 2 to 4.

The respondent (opponent) replied to the statement of the grounds for appeal and submitted the following additional citation:

- (9) "Handles Hard-to-Dry Products", Food Engineering, October 1971, pages 68 to 69

- V. Oral proceedings were held on 22 March 2001. During the hearings before the board, the appellant, while maintaining the main request, which was the set of claims considered by the opposition division, filed new auxiliary requests 1 to 4.

(A) Claim 1 of the main request reads as follows:

"1. A process for producing a mushroom flavourant for

foodstuffs which comprises providing an aqueous medium containing a *solution of* water-soluble salt of linoleic acid and homogenising mushrooms in the presence of said aqueous medium, introducing, during or after homogenisation, oxygen into the homogenised mushrooms, and adding at last one of a flavouring plant extract additive, of an edible oil additive and of a carrier additive suitable for spray drying the homogenate."

Dependent claims 2 to 9 relate to specific *embodiments* of the process according to claim 1.

(B) The set of claims in the first auxiliary request corresponds to claims 1 to 8 and 10 to 12 (renumbered 1 to 11) of the above main request, claim 1 differing as follows:

"1. A process ..... suitable for spray drying the homogenate, **and spray drying the homogenate and additives.**"

(C) The set of claims in the second auxiliary request corresponds to claims 1 and 3 to 12 (renumbered 1 to 11) of the above main request, claim 1 differing as follows:

"1. A process.....aqueous medium, introducing, **during homogenisation or after 1 to 30 s homogenisation,** oxygen into ....."

(D) The set of claims in the third auxiliary request corresponds to claims 1 and 3 to 12 (renumbered 1 to 11) of the above main request, claim 1 differing as follows:

"1. A process..... aqueous medium, introducing, **during homogenisation or as soon as possible after 1 to 30 s homogenisation,** oxygen into ....."

(E) The set of claims in the fourth auxiliary request corresponds to claims 1, 3 to 8, 10 and 11 (renumbered 1 to 9) of the above main request, claim 1 differing as follows:

"1. A process ..... aqueous medium, introducing, **during homogenisation or as soon as possible after 1 to 30 s homogenisation,** oxygen into <.....> suitable for suitable for spray drying the homogenate, **and spray drying the homogenate and additives.**"

Moreover, all the above main and auxiliary requests comprise at **least one product-by-process** claim in the form: **"The product of the process of claim 1 or 2 or 3".**

VI. The appellant's arguments submitted in writing and during the oral proceedings can be summarised as follows:

The purely scientific teaching of citations (1), (3) and (4) was essentially concerned with the explanation of the mechanism involved in the formation of the flavour compound 1-octen-3-ol in mushrooms or with the improvement of analytical techniques for determining the content of 1-octen-3-ol in mushrooms, but did not provide any incentive for a skilled person to develop the teaching of the cited documents into an useful,

commercially and industrially applicable process for producing a mushroom flavourant for foodstuffs.

It was known from citations (3) and (4) that by homogenising mushrooms and incubating them with linoleic acid or a water-soluble salt thereof, the 1-octen-4-ol content of mushrooms might be increased 5- and 2-fold respectively. Although (3) indicated that an oxidative reaction was involved in the conversion of linoleic acid into 1-octen-4-ol, no means were described in either of the above citations for the positive introduction of oxygen into the reaction mixture. It was not denied that citation (1) disclosed the supply of oxygen during incubation in a similar process. However, the oxygen was only introduced a certain time after homogenisation and there was, moreover, no mention of any unexpectedly large increase in the 1-octen-3-ol content.

The problem that the appellant's invention set out to solve was to increase the amount of natural mushroom flavour (1-octen-3-ol) which could be obtained from a given quantity of fresh mushrooms. Whereas the maximum increase reported in the cited state of the art was only 5-fold, the solution devised by the appellant enabled a 12.5- to 25-fold increase to be achieved. This calculation was based on the quantity of 10000 ppm of 1-octen-3-ol obtained on a dry weight basis in Example 1 of the patent in suit compared to the quantity of 400 to 800 ppm on a dry weight basis of 1-octen-3-ol in mushrooms reported in (3). In this context, the appellant also challenged the respondent's assertions that the mushrooms used in the examples of the patent in suit had an initial 1-octen-3-ol content of 200 ppm and, consequently, that the process in the



contested patent enabled only a 5-fold final increase of the 1-octen-3-ol content to be achieved.

In the process described in (3), the mushrooms were first homogenised and then incubated with linoleic acid whereas the appellant found that by homogenising the mushrooms in the presence of a water-soluble salt of linoleic acid and oxygen, a substantially greater increase in the 1-octen-3-ol content could be achieved.

In any case, the absolute concentrations of the flavouring compound 1-octen-3-ol achieved in the products disclosed in the state of the art were by far too low to be of interest for a commercially useful product. The state of the art according to (1) and (3) did not suggest the possibility of producing a spray-dried product which contained an amount of 1-octen-3-ol in the order of 1000 ppm based on the initial quantity of the mushrooms used or 10000 ppm based on the dry weight of the mushrooms present in the product.

VII. The respondent disagreed with the appellant and argued in the written submissions and during the oral proceedings as follows:

The appellant was incorrect in submitting that citation (1) and (3) were only concerned with the analytical detection of 1-octen-3-ol in mushrooms. On the contrary, all the citations clearly suggested to a person skilled in the art the possibility of producing a mushroom flavourant on a commercial and industrial basis. Even if one were to accept that the cited documents did not directly anticipate a commercial process for the production of such a flavourant, the skilled person would have derived from citations (1)

and (3) the idea of using the known oxidative conversion of linoleic acid or its salts into 1-octen-3-ol in the presence of a mushroom homogenate for the commercial production of mushroom products having a significantly improved mushroom-like aroma.

In this respect, the respondent emphasised that the disclosure of citations (1) and (3) was directed to practitioners in the food industry and that this disclosure in the state of the art was therefore the appropriate starting point for the skilled person faced with the problem of developing a process for the production of a mushroom flavourant. That the citations provided appropriate instructions and methods enabling a person skilled in the art to increase significantly the concentration of 1-octen-3-ol in mushroom products was not even contested by the appellant.

Contrary to the appellant's assertion, both citations (1) and (3) referred to the need to homogenise the mushrooms during or prior to the introduction of oxygen into the homogenate. Moreover, citation (3) made plain that the reason for the low concentration of 1-octen-3-ol in commercial mushroom products was the inactivation of the enzyme system catalysing the oxidative cleavage of linoleic acid before the homogenised and ruptured mushroom tissue was brought into contact with the oxygen.

The patent in suit and the appellant's submissions did not provide any convincing evidence supporting the allegation that the claimed process using a water-soluble salt of linoleic acid as the precursor was indeed capable of increasing the 1-octen-3-ol content in the homogenate to a significantly greater extent

than the process disclosed in the state of the art according to (3) in which linoleic acid was used as the precursor.

The patent itself stated that the incubation of mushrooms with linoleic acid as the precursor was reported in the state of the art to result in a 2-fold increase in the 1-octen-2-ol content. On the basis of this teaching, the person skilled in the art would from the data provided in comparative example A of the patent in suit necessarily arrive at the conclusion that the initial concentration of 1-octen-3-ol in the mushrooms used in the contested patent was about 200 ppm and, consequently, that the increase in the 1-octen-3-ol content achieved in Example 1 did not exceed 5-fold. This corresponded exactly to the increase in the 1-octen-3-ol content reported in (3). Moreover, the use of a water-soluble salt of linoleic acid in place of the free acid as the precursor was already disclosed in (1) and (4) and therefore obvious to those skilled in the art.

Finally, since citation (9) already described spray-drying as the most convenient and suitable method for the production of powdered mushroom flavourants, this feature which was introduced in the first and fourth auxiliary requests could not contribute to the acknowledgment of an inventive step either.

VIII. The appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of the sets of claims in its main request or alternatively its first, second, third or fourth auxiliary request.

The respondent requested that the appeal be dismissed.

## **Reasons for the Decision**

1. The appeal is admissible.

### *Amendments; Article 123(2) and (3) EPC*

2. Compliance with the requirements of Article 123(2) and (3) EPC of the set of claims of the main request is not at issue in this appeal, since this was the subject of previous decision T 13/95 of 11 June 1996 concerning the patent in suit and as such it is res judicata.

As for the auxiliary requests, there are no objections under Article 123(2) and (3) EPC, since the sets of claims of all four auxiliary requests are adequately supported by the original disclosure and do not extend the scope of protection conferred.

### *Product and process claims; preliminary remarks*

3. As to the patentability of the subject-matter claimed in all the present requests, the board considers it appropriate to make first the following preliminary remarks on the claims contained in the patent in suit:
  - 3.1 As is apparent from paragraph V *supra*, each of the five sets of claims forming the main and auxiliary requests 1 to 4 contains two different categories of claims, namely:
    - (i) process claims, relating to a process for

producing a mushroom flavourant for foodstuffs;  
and

(ii) product claims directed to the said mushroom flavourant *per se* solely defined in terms of the process for its production (ie "product-by-process" claims).

3.2 More specifically, claim 10 (main request), claim 9 (first, second and third auxiliary requests) and claim 8 (fourth auxiliary request) are directed to the product of the process of claim 1 or 2 or 3 and as such represent the respective broadest claim in each set of claims, because they cover this product (ie the mushroom flavourant) *per se*, regardless of the particular process for its production, and would thus confer absolute protection upon the claimed product (see decision T 411/89 cited in Case Law of the Boards of Appeal of the EPO; 3rd edition, 1998, page 177).

3.3 According to the case law of the Boards of Appeal, claims for products defined in terms of processes for their preparation ("product-by-process" claims) are admissible only if the products themselves fulfil the requirements for patentability, ie in particular if they are new and involve an inventive step. In this context, it is also appropriate to point out that Article 64(2) EPC provides no basis for the patentability of a claim which is formulated as a "product-by-process" claim, when the product *per se* does not meet the requirements for patentability set out in Article 52 EPC (see T 248/85 OJ EPO 1986, 261).

3.4 It follows that, if the patentability of a "product-by-process" claim is at issue, as in the present case, it

is appropriate to examine this aspect before the patentability of the process claims and independently therefrom, and the board will proceed accordingly.

*Novelty; Articles 52(1) and 54 EPC*

4. As the mushroom flavourant claimed in all the requests on file contains as a result of the process for its production at least one additive selected from a flavouring plant extract additive, a suitable oil additive and a carrier additive suitable for spray drying the homogenate, such products are distinguishable from those disclosed in all the prior art documents available in the proceedings at least to the extent they contain one of these additives.

Consequently, as regards novelty of the claims under consideration, the board has no reason to depart from the reasoning and the conclusion of the opposition division and does not consider further discussion of this issue to be appropriate. In any case novelty of the claimed products was no longer in dispute on appeal.

*Inventive step of product-by-process claim 10 of the main request; Articles 52(1) and 56 EPC*

*The closest state of the art*

5. The arguments of both parties, during the opposition and appeal proceedings, mainly relied upon documents (1) and (3).

- 5.1 Document (1) relates to the enzymatic oxidative breakdown of linoleic acid in mushrooms and elucidates

the mechanism of generation of 1-octen-3-ol in mushroom homogenates. The experimental procedure for the production of the homogenate enriched in the content of 1-octen-3-ol involves addition of linoleic acid and ammonia to the homogenate followed by its incubation under supply of oxygen, and is described in detail in the paragraph "Incubation experiments.." on page 187.

- 5.2 Document (3) discloses that the incubation of homogenised mushrooms (*psaliotta bispora* var. *alba*) with linoleic acid in a Na/K-phosphate buffer at pH 6.5 in the presence of oxygen resulted in a mushroom homogenate with a 5-fold increase in the 1-octen-3-ol content (see page 17, right-hand column, "Bildungsgeschwindigkeit" to page 18, left-hand column line 4 of the text). The pH value of 6.5 falls within the range from 5.5 to 8 specified in the contested patent (see column 3, lines 14 to 15).

This document is considered by the board as the closest prior art because it refers, *inter alia*, to 1-octen-3-ol as being the major and dominant flavouring compound of edible mushrooms and mentions in this context that commercial mushroom products for foodstuffs, such as mushroom soup or dry mushroom soup powder, designed to reproduce the typical natural mushroom flavour, suffer from the drawback of a very low concentration near to the detection limit of 1-octen-3-ol or are even devoid of this major flavouring compound naturally occurring in mushrooms (see (3), especially right-hand column, "Pilzprodukte"; page 19, left-hand column, lines 12 to 20). This teaching clearly suggests to the skilled reader that it would be desirable to have mushroom products capable of maintaining a sufficiently high concentration of natural mushroom flavour.

*The problem and the solution*

5.3 With a view to providing arguments in support of inventive step of the claimed product, the appellant referred repeatedly to the advantage of the allegedly higher content of the flavouring compound 1-octen-3-ol in the products produced by the process of claim 1 in comparison with prior art products. However, as will be explained in more detail below, the appellant failed to show any such improvement over the closest prior art product, namely that of document (3). For this reason an alleged increase in the concentration of 1-octen-3-ol in the final product cannot be taken into consideration for determining the technical problem to be solved by the invention.

5.4 Under these circumstances, the technical problem the invention sets out to solve is that of providing a product capable of imparting to foodstuffs an appropriate mushroom flavour.

The solution of this problem is a mushroom flavourant for foodstuffs which is significantly enriched in the flavouring compound 1-octen-3-ol and which comprises additives. On the basis of the examples in the patent in suit and in the absence of any evidence to the contrary, the board is satisfied that the problem has plausibly been solved.

*The skilled person*

5.5 The appellant relied in the statement of the grounds of appeal and during the oral proceedings on the argument that the documents cited in the opposition and appeal



proceedings were concerned only with certain scientific aspects relating to the elucidation of the mechanism of the formation and the determination of the flavouring compound 1-octen-3-ol in mushrooms. Therefore the addressee of these pieces of prior art was, in the appellant's opinion, not the skilled practitioner in the food industry faced with the problem of producing a commercial mushroom flavourant.

5.6 The board cannot agree. First of all, it is important to note that, in its introductory part (see especially column 1, 2<sup>nd</sup> paragraph), the patent in suit refers the skilled reader to prior publications, which are also concerned with the basic aspects of the formation and determination of 1-octen-3-ol in mushrooms, namely

- (i) B.O. de Lumen et al in J. Food Science 43, 698, 1978, which Article explained the role of lipxygenase systems in mushrooms catalysing the conversion of linoleic acid into 1-octen-3-ol,
- (ii) R. Trussl et al. which is the present citation (4), and
- (iii) M. Wurzenberger et al. which corresponds in every aspect to the state of the art disclosed in citation (1).

Thus, not only did the appellant itself cite in the contested patent background art which is to a large extent identical to the content and technical teaching of the documents cited in the present proceedings, but also the nature of the periodicals, in which citations (1), (3) and (4) have been published, makes it quite clear that the addressee of all cited documents is

undoubtedly the skilled practitioner in the food industry and that this person would be aware of the content of the cited documents.

- 5.7 Moreover, the board cannot recognise in the appellant's submissions any sound reason why the process disclosed in (3) should not be applicable to the production of a mushroom flavourant for foodstuffs on a commercial/industrial basis. Apart from the fact that the disclosure in the left-hand column on page 19 of (3) clearly suggests to a person skilled in the art the possibility of improving the flavour of commercial mushroom products by increasing their 1-octen-3-ol content using the method disclosed in (3), present claim 1 does not appear to require any essential additional or specific technical step, in comparison with those of the process disclosed in (3), to enable the production and recovery of a mushroom flavourant with a significantly increased 1-octen-3-ol content for a commercial or industrial purpose.

For the above reasons, the cited prior art documents are clearly directed to practitioners in the food industry and their content is, in the board's view, the correct and pertinent background for assessing the existence of an inventive step, which in any case cannot be substantiated by the envisaged commercial nature of the claimed product.

*Choice of 1-octen-3-ol as the flavouring compound*

- 5.8 As is derivable from the state of the art, see eg citation (4), the aroma of edible mushrooms consists of a broad variety of different volatile and less volatile natural flavouring components. Thus, the person skilled

in the art, faced with the stated technical problem had, in principle, the task of choosing one flavouring agent among many flavouring constituents of edible mushrooms for solving the problem posed and providing a natural mushroom flavourant for foodstuffs.

However, as in the introductory passages of the patent in suit acknowledged, the compound 1-octen-3-ol was commonly known to be the first and major flavouring compound of many mushroom species. For this reason, the substance was referred to in the art as "mushroom alcohol". This is confirmed by the cited documents stating (i) that 1-octen-3-ol "contributes significantly to the flavour of edible mushrooms" (see (1), especially the paragraph bridging the left- and right-hand column on page 187); (ii) that the compound 1-octen-3-ol is primarily responsible for the specific mushroom-like aroma (see (3), especially page 16, left-hand column, introduction, lines 1 to 2); and (iii) that the major aroma component in mushrooms, 1-octen-3-ol, possesses a mushroom-like aroma and is known as "mushroom alcohol" (see (4): especially page 89, left-hand column, lines 6 to 8 and table I, page 90).

5.9 Consequently, given the above-mentioned prior knowledge, the very choice of a mushroom flavourant enriched in 1-octen-3-ol as the principal flavouring component was self-evident to a person skilled in the art and could not contribute in itself to an inventive step involved in the proposed solution of the stated problem.

*The increased content of 1-octen-3-ol in the claimed products*

5.10 As already briefly mentioned in point 5.3 above, the appellant consistently argued that the alleged higher content of 1-octen-3-ol in the products produced by the process of claim 1 in comparison with the prior art products provided a clear indication and evidence of an inventive step associated with the claimed invention.

5.11 This argument must, however, fail for a number of reasons. First of all, no minimum level of the 1-octen-3-ol content to be achieved in the products of the claimed invention is specified in process claim 1 or product claim 10 and represents therefore no limiting feature of either of these claims.

5.12 Moreover, the patent in suit clearly indicates that, when a mushroom flavourant is produced according to the claimed process, the increase in the 1-octen-3-ol content can be more than quadrupled as compared to the untreated mushroom starting material (see column 1, lines 32 to 36). Consequently, the conclusion must be drawn that a 4-fold increase in the 1-octen-3-ol content is considered in the patent in suit to be fully satisfactory to meet the standards required by the claimed invention. This is, however, clearly less than the 5-fold increase reported and demonstrated in (3) (see especially page 18, left-hand column, first line, and Table 2) and implies that no advantage over the closest state of the art can be recognised.

5.13 Notwithstanding the above, the appellant relied in support of inventive step on an allegedly 12.5 to 25-fold increase in the 1-octen-3-ol content of the claimed product, as compared to the 5-fold increase in

citation (3). More specifically, the concentration of 1-octen-3-ol is said to be 10000 ppm on a dry weight basis in the product of example 1 of the patent in suit, while it ranges only from 400 to 800 ppm on a dry weight basis according to Table 2 of (3). However, this comparison with document (3) is meaningless, since it is not based on strictly comparable experimental conditions, but on a purely theoretical calculation. In fact, there are three significant differences, which render the above comparison offered by the appellant irrelevant to the assessment of inventive step in the present case.

First the species of mushrooms used in Example 1 of the patent in suit is different from that used in (3).

Second, the 1-octen-3-ol content of the mushrooms used as the starting material in Example 1 is nowhere indicated, although their content may vary strikingly depending on various factors, as shown, for example in (3), Table 2, reporting a range of from 43 ppm to 100 ppm, or Table 4, reporting a range of from 935 ppm to less than 2 ppm.

Finally, and perhaps most important, the extent of the 1-octen-3-ol content in the product depends primarily on the absolute quantity of the precursor (linoleic acid or a salt of linoleic acid), added to the mushroom homogenate during incubation, and on the proportion of said precursor to the total quantity of mushrooms used as the starting material. Any comparison not based on the same quantities of the precursor (linoleic acid or its salt) and of the same kind of mushrooms in each experiment is entirely meaningless and must therefore be disregarded.

5.14 In view of the foregoing, the conclusion must be drawn that the additional advantages referred to by the appellant have not been demonstrated, and therefore cannot be taken into consideration in the assessment of inventive step (see decision T 20/81, OJ EPO 1982, 217).

*The salt factor*

5.15 Claim 1 provides that the linoleic acid is supplied in the form of water-soluble salt. The use of a water-soluble salt of linoleic salt instead of the free acid was, in the appellant's contention, responsible for the alleged increase in 1-octen-3-ol content in the final product.

The board can accept that the results obtained in comparative example A of the patent in suit show that the use of a water-soluble salt of linoleic acid as the precursor in place of the same quantity of the free acid may advantageously increase by 2.5 times the concentration of 1-octen-3-ol in the mushroom homogenate.

5.16 However, the higher concentration of 1-octen-3-ol resulting from using a water-soluble salt rather than the free linoleic acid as the substrate could possibly be recognised as an advantageous effect associated with the process of claim 1 only, but not with the product *per se* of claim 10.

In this respect, the board first observes that, irrespective of whether linoleic acid or one of its water-soluble salts is used as the precursor, the product of the oxidative cleavage of the precursor is

in both cases qualitatively the same, namely 1-octen-3-ol.

Similarly, the quantitative result of the oxidative cleavage, ie the effective concentration of 1-octen-3-ol obtained in the final product, depends not only on the choice of using either linoleic acid or its salt as the precursor, as suggested by the appellant, but also on a number of other different factors and parameters. For example, it varies broadly according to the respective quantities of linoleic acid or its salt added as the precursor to the mushroom homogenate during incubation and the respective proportion of the precursor to the total quantity of mushrooms used as the starting material. Thus, given a certain quantity of mushrooms, the effective concentration of 1-octen-3-ol in the final product obtained by using a water-soluble salt of linoleic acid could be more than matched, when using linoleic acid instead, by appropriately increasing the absolute quantity of the acid, or its proportion to the total quantity of mushrooms used. For this reason, an allegedly relatively high concentration of 1-octen-3-ol observed in the final product must in the present case not necessarily be the result of using a water-soluble salt of linoleic acid instead of the free acid, but could be achieved by various other routes as well.

- 5.17 Consequently, in view of these different parameters and factors contributing to the achievement of a particular 1-octen-3-ol content in the final product, no definite and direct causal link exists between the use of a water-soluble salt of linoleic acid as the precursor and a certain given concentration of 1-octen-3-ol observed in the final product. Hence, in the absence of

such causal link, the feature of using a water-soluble salt of linoleic acid in place of the free acid in the process of present claim 1 cannot contribute to the acknowledgment of an inventive step of the product *per se* of claim 10 either.

5.18 In addition to the above discussed points, it must also be taken into consideration that the use of water-soluble salts of linoleic acid, namely potassium or ammonium salts, as the precursors for their enzymatic conversion into 1-octen-3-ol is already disclosed in both citations (1) and (4) (see (1), page 187, left-hand column, "Incubation Experiments", lines 1 to 5 and (4), page 89, right-hand column, lines 5 to 8). The use of a water-soluble salt in the claimed process was therefore straightforwardly obvious to a person skilled in the art.

5.19 Finally, the description of the patent in suit states that the pH value of the aqueous medium during homogenisation may vary within the range of from 5.5 to 8.0. During the oral proceedings the respondent argued that at least in part of that range of pH values any water-soluble linoleic acid salts exist in their equilibrium with the free linoleic acid and that therefore the homogenised mushroom mixture of the present invention, like those of the prior art, comprises both the salt of linoleic acid and the free linoleic acid in the state of equilibrium. In this respect, the board agrees with the respondent's submissions.

5.20 In view of the foregoing, the board considers that the use of a salt of linoleic acid in the preparation of the product of claim 10 does not endow the obtained



product with an inventive step.

*The additives*

5.21 The process of claim 1 as amended in the course of the opposition proceedings calls for the addition to the homogenate of at least one additive selected from a flavouring plant extract additive, an edible oil additive, such as cotton seed oil or soya oil, or carrier additives suitable for spray drying, such as maltodextrins, starches or gums. However, these are typical additives which the skilled person would conventionally use, if necessary, in the technology of foodstuff preparation to achieve different types of well known effects. No specific beneficial or unexpected effect associated with the addition of these additives to the claimed mushroom flavourant is envisaged in the disclosure of the patent in suit, nor was such an effect claimed by the appellant.

Consequently, in the absence of any evidence showing that the particular choice of any such additives was unexpectedly associated with some novel effect, advantage or improvement in the relevant properties of the claimed mushroom flavourant, the conclusion must be that their addition imparts to the claimed product only properties which were fully predictable by the skilled person.

5.22 In view of the foregoing considerations no contribution to inventive step of the product of claim 10 can be derived from any of the technical features of the process according to claim 1, because the product of the claimed process merely exhibits properties and effects which the skilled person would expect on the

basis of the teaching of citation (3) combined with his general knowledge in the art. Consequently, the subject-matter of independent claim 10 does not involve an inventive step within the meaning of Article 56 EPC.

Since a decision can only be taken on a request as a whole, there is no need, in the context of the main request, to examine the patentability of the other product claims or the process claims as well. As far as the main request is concerned, the appeal is therefore unsuccessful.

*First Auxiliary Request*

6. Claim 9 relates to the product of the process of claim 1. As is apparent from paragraph V(B) above, claim 1 of the first auxiliary request differs from the main request in that the additives and the homogenate are spray-dried to recover the product in a spray-dried form.

6.1 The added feature does not change the technical problem to be solved by the invention as formulated in relation to the main request. The solution of the problem is a product which, beyond the features already seen in relation to the main request, is in the form of a spray-dried product.

The spray-drying technique is conventionally used in the food industry to produce powdered products, as is evident from citation (9). This document discloses that spray drying was found to be particularly suitable for flavour encapsulation (see page 68, end of left-hand column) and recommends its use particularly for the conversion of all kind of flavours, for example, meat

flavours such as beef and ham, vegetable flavours and specialties such as chives, horseradish, blue cheese, mushroom and wine flavours into spray-dried products (see especially page 69, left-hand column, penultimate paragraph). Thus, the skilled person seeking in the state of the art an appropriate method for processing a mushroom homogenate enriched in the flavouring compound 1-octen-3-ol into an appropriate product for commercial use would have inevitably considered spray-drying as a suitable means.

6.2 In this respect, it must be emphasised that an inventive step cannot be the result of the simple aggregation of steps or elements which are obvious in themselves and which do not interact with all the others to result in a novel and inventive common effect. Nowhere in the patent disclosure is it mentioned that spray-drying would have brought about unexpected results or that the product of claim 9 could not have been produced in a fairly straightforward manner by using conventional method of spray-drying. Therefore, the skilled person would not have expected spray-drying the claimed product to produce any specific effects beyond those typical of any spray-dried foodstuff.

6.3 In view of the foregoing observations, the conclusion must be drawn that the product of claim 9 does not involve an inventive step within the meaning of Article 56 EPC and that the first auxiliary request is accordingly also to be refused as a whole.

*Second Auxiliary Request*

7. Claim 9 relates to the product of the process of

claim 1. As can be seen from paragraph V(C) above, claim 1 of the second auxiliary request differs from the above main request in that the period of homogenisation before introducing oxygen into the homogenised mushrooms is limited to 1 to 30 seconds.

- 7.1 Citation (3) discloses that the flavouring component 1-octen-3-ol is formed immediately when oxygen is capable of penetrating the mushroom tissue ruptured during the homogenisation (see page 17, right-hand column, "Bildungsgeschwindigkeit", second paragraph) and suggests that the low level of 1-octen-3-ol present in mushroom products could be due to the rapid inactivation of the enzyme system catalysing the oxidative cleavage of the linoleic acid precursor into 1-octen-3-ol.

Thus document (3) implicitly recommends that the homogenised mushroom material should be permeated with oxygen as quickly as possible during or after homogenisation. On the basis of these considerations, the board cannot recognise in the requirement that the oxygen treatment must immediately follow a short (1-30 seconds) homogenisation a contribution to the inventive step of the product of claim 9. No such contribution is apparent in either the specification of the patent in suit or in the appellant's submissions .

- 7.2 The board therefore concludes that the product of claim 9 does not involve an inventive step within the meaning of Article 56 EPC either. As far as the second auxiliary request is concerned, the appeal is therefore likewise unsuccessful.

*Third Auxiliary Request*

8. Claim 9 relates to the product of the process of claim 1. As can be seen from a comparison of paragraph V(C) with paragraph V(D) above, the feature in claim 1 of the second auxiliary request reading "introducing, during homogenisation or after 1 to 30 seconds homogenisation, oxygen into the homogenised mushrooms has been reworded in claim 1 of the third auxiliary request to read: "introducing, during homogenisation or **as soon as possible** after 1 to 30 seconds homogenisation, oxygen into the homogenised mushrooms".

8.1 The expression "as soon as possible" indicates an imprecise span of time which can have no clear technical meaning and limiting effect on the scope of the claim. The board can therefore only recognise a mere linguistic, but not substantive, difference between the two above-mentioned features. Consequently, all the considerations in relation to the second auxiliary request apply equally to the third auxiliary request and the two requests must share the same fate.

#### *Fourth Auxiliary Request*

9. Claim 8 relates to the product of the process of claim 1 which combines the above-mentioned features in the first and third auxiliary requests. As already indicated in relation to the first auxiliary request, an inventive step cannot be the result of the simple aggregation of steps or elements which are all obvious in themselves and which do not interact with each other to produce a novel and inventive common effect. Thus, in the absence of any convincing argument or evidence to the contrary, the board sees no reason why the combination of these two features, which in themselves do not contribute to an inventive step of the claimed

product, should render the product of claim 8 inventive.

9.1 The board therefore concludes that the product of claim 8 does not involve an inventive step within the meaning of Article 56 EPC either and that the fourth auxiliary request must therefore also be refused as a whole.

## **Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman

A. Townend

C. Germinario