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**Datasheet for the decision  
of 19 May 2016**

**Case Number:** T 1110/13 - 3.3.09  
**Application Number:** 07727190.6  
**Publication Number:** 1998636  
**IPC:** A23L1/236, C11B9/00, C07C49/84  
**Language of the proceedings:** EN

**Title of invention:**

USE OF 4-HYDROXYDIHYDROCHALCONES AND THEIR SALTS FOR ENHANCING  
AN IMPRESSION OF SWEETNESS

**Patent Proprietor:**

Symrise AG

**Opponent:**

Döhler GmbH

**Headword:**

**Relevant legal provisions:**

EPC Art. 54, 56, 83, 114, 123(2)  
RPBA Art. 13(3)

**Keyword:**

Late-filed request - admitted (yes)  
Amendments - added subject-matter (no)  
Sufficiency of disclosure - (yes)  
Novelty - (yes)  
Late submitted material - correct exercise of discretion (yes)  
Request to suspend the proceedings in order to carry out  
additional documentary search (refused)  
Inventive step - (yes)  
Late-filed argument - admitted (yes)

**Decisions cited:**

**Catchword:**



**Beschwerdekammern**  
**Boards of Appeal**  
**Chambres de recours**

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Case Number: T 1110/13 - 3.3.09

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.09**  
**of 19 May 2016**

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**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted on 3 April 2013  
rejecting the opposition filed against European  
patent No. 1998636 pursuant to Article 101(2)  
EPC.**

**Composition of the Board:**

**Chairman** J. Jardón Álvarez  
**Members:** N. Perakis  
D. Prietzel-Funk

## Summary of Facts and Submissions

- I. This decision concerns the appeal filed by the opponent against the decision of the opposition division rejecting the opposition filed against European patent N° EP 1 998 636.
- II. With the notice of opposition the opponent requested the revocation of the patent in its entirety on the grounds of Article 100(a) (lack of novelty and inventive step) and 100(b) EPC.

The documents filed during opposition included the following:

- D2: English machine translation of JP2004/043354;  
D3: US 4 304 794 A;  
D8: US 3 087 821 A;  
D11: Journal of Chemical Ecology, 26(10), 2000, pp 2275-2290; and  
D14: C. Güther, Dissertation: "Der Einfluss des Flavonoids Phloretin auf die Thrombozytenaktivität und die Aggregationshemmung", published 21 November 2008.

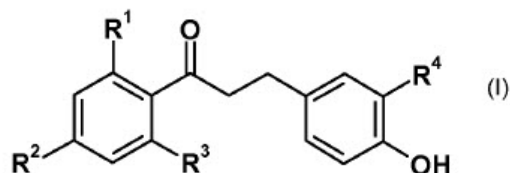
- III. The opposition division rejected the opposition because it considered that:
- the claimed invention was sufficiently disclosed;
  - the claimed subject-matter was novel over D2 and D11;
  - D14, a post-published, late-filed document, was not *prima facie* relevant for the assessment of novelty and thus it was not admitted into the proceedings; and

- the claimed subject-matter involved an inventive step because the skilled person starting from D3, the closest prior art, would not have been motivated to combine it with D8.

- IV. On 25 April 2013 the opponent (in the following: the appellant) filed an appeal against the decision of the opposition division. The statement setting out the grounds of appeal was filed on 13 August 2013. The appellant requested that the decision of the opposition division be set aside and that the patent be revoked.
- V. With letter dated 23 December 2013, the patent proprietor (in the following: the respondent) filed observations on the appeal together with three auxiliary requests. The respondent requested that the appeal be dismissed, or, in the alternative that the patent be maintained on the basis of the claims of one of the three auxiliary requests.
- VI. With letter dated 17 February 2016, the appellant filed further arguments.
- VII. By communication of 22 March 2016 the board expressed its preliminary non-binding opinion on the issues raised.
- VIII. With letter dated 18 April 2016, the appellant filed additional arguments.
- IX. Oral proceedings were held on 19 May 2016 as scheduled. During the oral proceedings the respondent filed a new main request and withdrew all other requests. The new main request comprises twelve claims. Independent claims 1, 4, 10 and 12 read as follows:

"1. Use

- of a 4-hydroxydihydrochalcone of the formula (I)



wherein

R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup> and R<sup>4</sup> each, independently, represent H, OH or O-alkyl, with the proviso that at least one of the groups R<sup>1</sup>, R<sup>2</sup> or R<sup>3</sup> represents OH,

- a salt of such a 4-hydroxydihydrochalcone of the formula (I),
- a mixture containing or consisting of two or more different 4-hydroxydihydrochalcones of the formula (I), wherein R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup> and R<sup>4</sup> are each defined in the way given above,
- a mixture containing or consisting of salts of two or more different 4-hydroxydihydrochalcones of the formula (I), wherein R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup> and R<sup>4</sup> are each defined in the way given above

or

- a mixture containing or consisting of a 4-hydroxydihydrochalcone of the formula (I) or two or more different 4-hydroxydihydrochalcones of the formula (I), wherein R<sup>1</sup>, R<sup>2</sup>, R<sup>3</sup> and R<sup>4</sup> are each defined in the way given above, and

a salt of a 4-hydroxydihydrochalcone of the formula (I) or two or more salts of different 4-hydroxydihydrochalcones of the formula (I), wherein  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^4$  are each defined in the way given above,

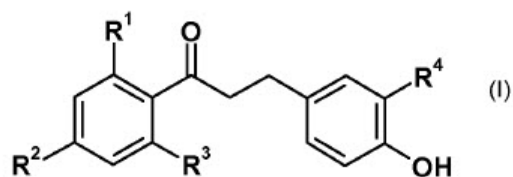
to enhance the sweet taste of a sweet-tasting substance or the impression of a sweet smell of a flavouring that gives an impression of a sweet smell."

[Identical to granted claim 1]

"4. A preparation from the group consisting of ~~preparations, semi-finished products or odour-providing, flavour-providing or taste-providing compositions or mixtures of spices~~ used for nutrition, oral hygiene or pleasure, containing the following components:

(a)

- a 4-hydroxydihydrochalcone of the formula (I)



wherein

$R^1$ ,  $R^2$ ,  $R^3$  and  $R^4$  each, independently, represent H, OH or O-alkyl, with the proviso that at least one of the groups  $R^1$ ,  $R^2$  or  $R^3$  represents OH,

- a salt of such a 4-hydroxydihydrochalcone of the formula (I),

- a mixture containing or consisting of two or more

different 4-hydroxydihydrochalcones of the formula (I), wherein  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^4$  are each defined in the way given above,

- a mixture containing or consisting of salts of two or more different 4-hydroxydihydrochalcones of the formula (I), wherein  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^4$  are each defined in the way given above

or

- a mixture containing or consisting of a 4-hydroxydihydrochalcone of the formula (I) or two or more different 4-hydroxydihydrochalcones of the formula (I), wherein  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^4$  are each defined in the way given above, and a salt of a 4-hydroxydihydrochalcone of the formula (I) or two or more salts of different 4-hydroxydihydrochalcones of the formula (I), wherein  $R^1$ ,  $R^2$ ,  $R^3$  and  $R^4$  are each defined in the way given above,

as well as

(b) one or more other sweet-tasting substances

and/or

(c) one or more flavourings that give the impression of a sweet smell,

wherein the total amount of component (a) in the preparation is sufficient to enhance to an overproportional extent the impression of a sweet taste of the sweet-tasting substance(s) (b) or the impression of a sweet smell flavouring(s) (c) that give an impression of a sweet smell,



wherein

a ~~the~~ preparation used for nutrition, oral hygiene or pleasure contains a total amount ~~of less than 0.025 wt. % (250 ppm), preferably less than 0.02 wt. % (200 ppm),~~ **in the range 1 to 50 ppm preferably in the range 10 to 50 ppm,** of (i) 4-hydroxydihydrochalcones of the formula (I) and (ii) their salts, with respect to the total weight of the preparation."

[The features deleted from or added to 4 as granted are struck through or highlighted in bold respectively]

"10. A process for enhancing the sweet taste of a sweet-tasting substance or the impression of a sweet smell of a flavouring that gives an impression of a sweet smell using the following step:

- mixing one or more sweet-tasting substances (component (b)) or one or more flavourings that give an impression of a sweet smell (component (c)) with a total amount of component (a) as defined in one of Claims 4 to 6,

wherein the total amount of component (a) in the preparation is sufficient to enhance the impression of a sweet taste of the sweet-tasting substance(s) (b) or the impression of a sweet smell of the flavouring(s) (c) that give an impression of a sweet smell,

wherein the total amount of (i) 4-hydroxydihydrochalcones of the formula (I) and (ii) their salts in a preparation used for nutrition, oral hygiene or pleasure is less than 0.025 wt.-% (250 ppm), preferably

less than 0.02 wt.-% (200 ppm), with respect to the total weight of the preparation."

[Identical to claim 13 as granted]

"12. 3-(4-hydroxy-3-methoxyphenyl)-1-(2,4,6-trihydroxyphenyl)propan-1-one (2',4,4',6'-tetrahydroxy-3-methoxydihydrochalcone; compound 8)."

[Identical to claim 15 as granted]

Dependent claims 2 and 3 correspond to claims 2 and 3 as granted. Dependent claims 5-8 correspond to claims 5-8 as granted. Dependent claim 9 corresponds to claim 12 as granted. Dependent claim 11 corresponds to claim 14 as granted.

- X. The relevant arguments put forward by the appellant in its written submissions and during the oral proceedings may be summarised as follows:

Admissibility

- The new main request, filed during the oral proceedings before the board, was late-filed and raised new issues. Therefore it should not be admitted into the proceedings in view of Article 13(3) RPBA.

Added subject-matter

- Claim 4 of the new main request did not meet the requirements of Article 123(2) EPC since the application as filed did not disclose:
  - a preparation limited to the group consisting of preparations used for nutrition, oral hygiene or pleasure; and

- the combination of (i) preparations used for nutrition, oral hygiene or pleasure with (ii) specific amounts of (i) 4-hydroxydihydrochalcones of the formula (I) and (ii) their salts.

#### Sufficiency

- The claimed invention was not sufficiently disclosed because the patent did not define the terms "sweetness enhancement" and "overproportional sweetness enhancement" and did not describe any reliable test for measuring either enhancement. The test used did not use a reference solution and the results in the tables of paragraphs [0102] and [0103] were not reproducible.

#### Novelty

- The subject-matter of independent claim 4 (product claim) lacked novelty in view of D2, which disclosed in paragraphs [0011] and [0022] an oral care product comprising 0.001% (10 ppm) or 0.0001% (1 ppm) of naringenin dihydrochalcone or eriodictyol dihydrochalcone and implicitly enhancing the impression of a sweet taste or the impression of a sweet smell flavouring to an overproportional extent.

#### Inventive step

- The subject-matter of independent claim 1 (use claim) did not involve an inventive step in view of the obvious combination of D3, considered as the closest prior art, either with the common general knowledge of the skilled person (see patent in suit paragraphs [0023] to [0025]) or with D8. Claim 1 differed from D3 only in the chemical structure of the dihydrochalcone, namely the substituent at position 4 of the B ring, which was now a hydroxy

group instead of a methoxy group. This difference had not been shown to provide any technical effect. The technical evidence of the patent was incomplete as it did not show the contribution of phloretin to the total sweetness of the composition. Thus, the technical problem was the provision of an alternative dihydrochalcone for the same use. The solution was obvious to the skilled person either in view of his general technical knowledge as disclosed in the patent in suit or in view of D8, which disclosed 4-hydroxydihydrochalcones falling within the definition of claim 1 (see examples 1 and 4).

- Independent product claim 4 also did not involve an inventive step. D2 (paragraph [0032]) was the closest prior art; the subject-matter of claim 4 differed from it only as regards the amount of dihydrochalcone involved in the preparation. D2 disclosed in example 1 an amount of 0.01 g (i.e. 100 ppm) of naringenin dihydrochalcone, whereas claim 4 required a maximum of 50 ppm. However, the reduction of the amount of the dihydrochalcone was not related to any technical effect. It was simply based on cost considerations. The claimed reduced amount was therefore obvious.

XI. The relevant arguments put forward by the respondent in its written submissions and during the oral proceedings may be summarised as follows:

Admissibility

- The main request should be admitted into the proceedings because it was in conformity with Article 13(3) RPBA. The limitation of the subject-matter of claim 4 did not raise any new issues

which the appellant was not able to deal with during the oral proceedings.

Added subject-matter

- Claim 4 fulfilled the requirements of Article 123(2) EPC. Its subject-matter resulted from the combination of claim 5 and 13 as filed, further limited regarding:
  - the type of the preparation in claim 5, so that it concerned one of the listed alternatives used for nutrition, oral hygiene or pleasure, namely "preparations" (this was a selection from one list of alternatives); and
  - the total amount of 4-hydroxydihydrochalcones in the preparation used for nutrition, oral hygiene or pleasure, so that it concerned the preferred or particularly preferred amounts disclosed in claim 13.

The selection of one of the disclosed alternatives and the selection of the preferred and particularly preferred amounts of 4-hydroxydihydrochalcones complied with the requirements of Article 123(2) EPC, since these amounts applied to all alternatives of the preparation of claim 5 and no intermediate generalisation was made.

Sufficiency

- The invention underlying the claims was also sufficiently disclosed. The appellant had not filed any evidence to the contrary. Regarding the test to evaluate sweetness, it was an ordinary one. The results in the tables of paragraphs [0102] and [0103] undeniably showed a qualitative sweetness improvement.

Novelty

- The subject-matter of independent product claim 4 was novel over the disclosure of D2. Contrary to the assertions of the appellant, the lower values of the ranges for the amount of the hyaluronidase inhibitors disclosed in paragraph [0022] of D2 were not clearly and unambiguously linked to the specific hyaluronidase inhibitors naringenin dihydrochalcone or eriodictyol dihydrochalcone disclosed in paragraph [0011]. Furthermore, the specific paragraphs of D2 did not disclose one or more other sweet-tasting substances and/or one or more flavourings that gave the impression of a sweet smell as required by claim 4 of the main request.

Inventive step

- The subject-matter of claim 1 relating to the use of specific 4-hydroxydihydrochalcones to enhance the sweet taste of a sweet-tasting substance involved an inventive step. D3, which dealt with food and beverages but also oral and cosmetic compositions having greatly enhanced sweetness, could be considered as the closest prior-art document. The compositions of D3 included a 4-hydroxydihydrochalcone which was structurally different from those of claim 1. The technical problem in view of D3 was to enhance the sweet taste of a sweet-tasting substance. The technical evidence of the patent in suit (table in paragraph [0102]) was adequate proof of a qualitative enhancement. The skilled person starting from D3 and seeking to solve the said technical problem would not have found in the prior art any motivation to replace the 4-hydroxydihydrochalcone of D3 with that of claim 1. D2 related to

dihydrochalcones to be used as hyaluronidase inhibitors and was therefore irrelevant. D8 was also irrelevant because it related to dihydrochalcone-glycosides which were used as sweeteners *per se* and not to enhance the sweetness of a sweet-tasting substance. But even if D8 had been considered to enhance sweetness, this effect was disclosed to have been achieved by glycosides and not by the corresponding dihydrochalcones. Thus if the skilled person had combined D3 with D8, he would not have arrived at the subject-matter of claim 1. Lastly, the skilled person would not have had any reason to replace the dihydrochalcone of D3 by the known 4-hydroxydihydrochalcone phloretin (see patent: paragraph [0025]). This assertion of the appellant was based on hindsight.

- The subject-matter of independent product claim 4 involved an inventive step for the reasons given for claim 1. Contrary to the assertions of the appellant, D3 was the closest prior-art document and not D2. In fact the skilled person would not have considered D2, since it related to a different field of application of the dihydrochalcones, namely to their use as hyaluronidase inhibitors. But even if he had done so, he would not have found in D2 the motivation to reduce the amount of those dihydrochalcones which fell within the scope of claim 4 in order to enhance the impression of sweet taste of sweet-tasting substances.

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

The respondent requested that the decision under appeal be set aside and that the patent be maintained on the

basis of claims 1 to 12 filed as main request on 19 May 2016 during the oral proceedings.

## **Reasons for the Decision**

### **1. Admissibility of the main request**

1.1 The main request was filed during the oral proceedings before the board. The appellant disputed its admissibility and argued that it was late-filed and raised new issues, such as unallowable amendments to the subject-matter of claim 4.

1.2 The board, however, considered that the late-filed request complied with the requirements of Article 13(3) RPBA, since it did not raise issues which the board or the appellant could not be expected to deal with without adjournment of the oral proceedings. In fact, the claims of this request corresponded to the claims as granted, with the difference that dependent claims 9 to 11 had been deleted and the subject-matter of claim 4 has been limited to exclude the preparation known from D2.

### **2. Amendments under Article 123(2) EPC**

2.1 The appellant argued that the subject-matter of claim 4 was neither disclosed in nor derivable from the application as filed.

2.2 The board does not agree. Claim 4 of the main request results from the combination of the subject-matter of claims 5 and 13 as filed, this combination being further limited regarding:



- the type of the preparation, so that it now concerns preparations used for nutrition, oral hygiene or pleasure and
- the total amount of (i) the 4-hydroxy-dihydrochalcones of formula (I) and (ii) their salts contained in the preparations used for nutrition, oral hygiene or pleasure, so that it is now in the range 1 to 50 ppm, preferably in the range 10 to 50 ppm.

2.3 Claim 5 as filed relates to a preparation from the group consisting of preparations, semi-finished products or odour-providing, flavour-providing or taste-providing compositions or mixtures of spices used for nutrition, oral hygiene or pleasure.

Claim 13 as filed, dependent on claim 5, relates to a particular embodiment of claim 5, according to which the preparation is used for nutrition, oral hygiene or pleasure and contains a total amount of (i) 4-hydroxydihydrochalcones of the formula (I) and (ii) their salts, with respect to the total weight of the preparation preferably in the range 1 to 50 ppm, particularly preferably in the range 10 to 50 ppm.

Thus the combination of claims 5 and 13 directly and unambiguously discloses a preparation used for nutrition, oral hygiene or pleasure which can have the form of any of the six alternatives:

- preparations,
- semi-finished products,
- odour-providing compositions,
- flavour-providing compositions,
- taste-providing compositions, or
- mixtures of spices,

wherein, the amount of 4-hydroxydihydrochalcones is in the range 0.1 to 150 ppm, preferably in the range 1 to 50 ppm, particularly preferably in the range 10 to 50 ppm.

- 2.3.1 The limitation of the combination of the above claims to one of the disclosed alternatives of the preparation used for nutrition, oral hygiene or pleasure, namely to "preparations", is allowable under Article 123(2) EPC.
- 2.3.2 Furthermore, the amount of 4-hydroxydihydrochalcones, including the preferred and particularly preferred ranges, concerns equally all six alternatives of the preparation used for nutrition, oral hygiene or pleasure, since no distinction was made anywhere in the patent. Therefore, the limitation in claim 4 of the main request of the amount of 4-hydroxydihydrochalcones to the preferred and particularly preferred amounts of claim 13 is directly and unambiguously derivable from the application as filed.
- 2.4 On the basis of the literal wording of claim 5 as filed, the appellant asserted that only the last of the listed alternatives of the preparation, namely "mixture of spices", was directly and unambiguously disclosed to be used for nutrition, oral hygiene or pleasure. The board disagrees with this very strict, artificial interpretation of claim 5. According to the board, the only sensible reading of claim 5, considered either in isolation or in the light of the application as a whole, is that the use "for nutrition, oral hygiene or pleasure" applies to the preparation in general covering all six alternative forms of the claimed preparation and not exclusively to the one listed in last place. This is corroborated by the application as filed, which refers to the preparations intended for

nutrition, oral hygiene or pleasure in general terms (see page 22, lines 8-18):

*"Preparations according to the invention and intended for nutrition, oral hygiene or pleasure are usually products that are specified for introduction into a person's mouth, remain there for a certain length of time and are then either eaten (e.g. consumable foodstuffs) or removed from the mouth again (e.g. chewing gum or toothpaste)".*

Therefore, contrary to the assertions of the appellant, there is no basis in the application as filed for the alleged exclusive use of mixtures of spices for nutrition, oral hygiene or pleasure.

2.5 The appellant also asserted that the subject-matter of claim 4 resulted from selections from two lists, the first being the list of the six alternatives for the preparation for nutrition, oral hygiene or pleasure disclosed in claim 5 as filed and the second being the various ranges of the amount of 4-hydroxydihydro-chalcones disclosed in claim 13 as filed. As already explained above, this assertion is untenable since all ranges listed in claim 13 as filed apply equally to all alternatives of the preparation of claim 5 as filed.

2.6 On the basis of the above, the subject-matter of claim 4 of the main request is considered to comply with the requirements of Article 123(2) EPC.

### **3. Sufficiency of disclosure**

3.1 The appellant disputed the sufficiency of disclosure of the claimed invention. Three issues were raised in the statement setting out the grounds of appeal, namely

- (i) the definition of the sweetness enhancement,
- (ii) the definition of the sweetness enhancement to an overproportional extent, and
- (iii) the reliability of the test procedure for measuring the sweetness and the sweetness enhancement.

3.2 The objections concerning the definitions of "sweetness enhancement" and "sweetness enhancement to an overproportional extent" are clarity objections and not objections relating to sufficiency of disclosure. As the respondent correctly observed, the appellant, who bears the burden of proof, did not provide any evidence to demonstrate that these terms were so ill-defined that the skilled person was unable to carry out the claimed invention. Anyway, the skilled person would interpret these terms on the basis of his general technical knowledge and the entire disclosure of the patent in suit.

3.2.1 It is beyond doubt that the literal meaning of the term sweetness enhancement in the context of the claimed invention is that the preparation will be sweeter than the sweet-tasting substance it comprises. This enhancement is quantified in the patent in suit to be at least 1.05 times the amount of sugar (i.e. the sweet-tasting substance) (see paragraphs [0022] and [0030]).

3.2.2 Regarding sweetness enhancement to an overproportional extent, the patent in suit discloses that such enhancement is synonymous with a synergistic increase (page 8, lines 18-19 and 47), which according to the common general knowledge of the skilled person means that the sweetness of the preparation is stronger than the sum of the sweetness of the individual ingredients it is made of, namely the 4-hydroxydihydrochalcone and

the sweet-tasting substance. The evidence of the sweetness enhancement to an overproportional extent, necessary to demonstrate that the effect sought is achieved, is an issue to be dealt with within the context of inventive step (reference is made to section 5.2.4 below).

3.3 With regard to the test used in the patent to measure sweetness, the board does not agree that it is unreliable because it lacks precision, is subjective and does not involve a reference solution. It is true that the test does not provide absolute values since they depend on the test panel. This is, however, how tests in this technical field are carried out. Moreover, it cannot be ignored that the results of the test show a qualitative trend, even in the absence of a reference solution. As the respondent correctly stated, the test is precisely described and can be reproduced by the skilled person. Lastly, the appellant who bears the burden of proof did not submit any evidence to the contrary.

3.4 In view of the above, the patent in suit is considered to disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

#### **4. Novelty**

4.1 The appellant disputed the novelty of the subject-matter of claim 4 in view of the disclosures of D2 and D14, and known apple juice compositions like those mentioned in the patent.

4.2 Claim 4 (see above point IX) relates to a preparation which:

- is used for nutrition, oral hygiene or pleasure (paragraph [0049] explains the meaning of these preparations) [**feature 1**];
- contains component (a) which is based on a 4-hydroxydihydrochalcone of formula (I) [**feature 2**];
- contains component (b) which is one or more other sweet-tasting substances [**feature 3**]; and/or
- contains component (c) which is one or more flavourings that give the impression of a sweet smell [**feature 4**],

wherein:

- the total amount of component (a) in the preparation is sufficient to enhance to an overproportional extent the impression of
  - a sweet taste of the sweet-tasting substance(s) (b), or
  - sweet smell flavouring(s) (c) that give the impression of a sweet smell[**feature 5**];
- the total amount of component (a) in the preparation is in the range 1 to 50 ppm, with respect to the total weight of the preparation [**feature 6**].

4.3 Concerning D2, the appellant contested the novelty of claim 4 on the one hand in view of specific examples of D2 and on the other hand in view of its general disclosure.

- 4.3.1 D2 relates to compositions, to be either applied to the skin or eaten or drunk, which contain an inhibitor of the hyaluronidase enzyme, the latter being responsible for skin ageing as well as inflammatory and allergic reactions in living organisms (see paragraphs [0004] - [0009] and [0021]). The inhibitor contains a specific dihydrochalcone as an active principle (see paragraph [0001]).
- 4.3.2 Examples 1, 4 and 6 of D2 (see paragraphs [0032], [0035] and [0037]) disclose preparations containing a sugar, i.e. feature 3 of claim 4, as well as naringenin dihydrochalcone and eriodictyol dihydrochalcone, i.e. feature 2 of claim 4. However, the total amount of the dihydrochalcone in each of the exemplified compositions is higher than the amount required by feature 5 of claim 4. In example 1 the amount is 0.01 g (100 ppm), in example 4 it is 1 g for a total of 1 kg (1,000 ppm) and in example 6 it is 10 g for 100 g (10,000 ppm). On the basis of this difference alone, claim 4 is novel over the specific embodiments of D2.
- 4.3.3 The general disclosure of D2 relates to a dihydrochalcone to be used in cosmetic preparations (paragraph [0008]) and in eating or drinking articles (paragraph [0009]). The dihydrochalcone has a specific chemical structure with substituent R<sub>2</sub> on the B ring whose definition encompasses the hydroxyl group of claim 4, feature 2 (paragraph [0007]). Naringenin dihydrochalcone and eriodictyol dihydrochalcone, which fall within the definition of feature 2 of claim 4, are two of the exemplified dihydrochalcones suitable to be used as an active principle of hyaluronidase inhibitor (paragraph [0011]).

However, the general disclosure of D2 does not disclose the combination of the exemplified naringenin dihydrochalcone and eriodictyol dihydrochalcone with amounts that fall within feature 6 of claim 4. D2 simply requires that it "should just be the quantity demonstrated effectively" (page 5, lines 29-30 and 43-44). The term "effectively" has to be understood in the technical context of D2, i.e. the prevention of the hyaluronidase enzyme to cause skin ageing and to trigger inflammatory or allergic reactions. The effective amounts disclosed in D2 vary within very broad ranges, namely from 0.01 to 1% (100 to 10,000 ppm), suitably from 0.001 to 2% (10 to 20,000 ppm), preferably from 0.0001 to 5% (1 to 50,000 ppm) when used for cosmetics (paragraph [0022]) and from 0.1 to 10% (1,000 to 100,000 ppm) suitably from 0.01 to 50% (100 to 500,000 ppm) when used for eating and drinking (paragraph [0023]). Although the lower values of some of the ranges overlap with the values of the ranges in feature 6 of claim 4, the skilled reader would not find any pointer in D2 which would lead him to clearly and unambiguously combine the lowest values of these specific ranges, i.e. those that fall within the values of feature 6 of claim 4, with those dihydrochalcones of D2 whose substituent R2 is a hydroxyl group and fall within the definition of feature 2 of claim 4, in particular the exemplified naringenin dihydrochalcone or eriodictyol dihydrochalcone. In fact, the skilled person has to make arbitrary selections in order to arrive at the subject-matter of claim 4.

4.3.4 On the basis of the above, the subject-matter of claim 4 is novel over D2.



4.4 During the oral proceedings, the appellant requested the opportunity to carry out additional documentary search, if the board considered that novelty over D2 was based on the fact that cosmetic products of D2 (paragraph [0022]) with a dihydrochalcone content of as low as 1 or 10 ppm did not enhance to an overproportional extent the impression of a sweet smell flavouring that gave an impression of a sweet smell.

This request was rejected because the subject-matter of claim 4 did not clearly and unambiguously derive from the disclosure of D2, irrespective of the impression of sweet smell enhancement (see sections 4.3.2 and 4.3.3).

4.5 D14 is a post-published document filed one month before the oral proceedings before the opposition division and was not admitted into the proceedings by it on the ground that it was *prima facie* not relevant to novelty (see section 2.3 on page 7 of the appealed decision). As the appellant contested novelty of the subject-matter of claim 4 in view of D14, it is first to be decided whether the decision of the opposition division not to admit D14 into the proceedings should be overruled by the board.

The appellant has not convincingly shown that the opposition division did not correctly exercise its discretion in not admitting D14 into the opposition proceedings. It merely disagreed with the finding of the opposition division that the document was not relevant. In its view D14, although post-published, proved that apples contained phloretin and known apple juices would then be novelty-destroying for the subject-matter of claim 4.

The board agrees with the opposition division that D14 is not relevant. The fact that phloretin is present in apples is even disclosed in the patent in suit itself. In view of this, there are no reasons for the board to overturn the opposition division's decision not to admit D14 into the proceedings.

- 4.6 Lastly, the appellant argued that the known apple juice compositions, such as those mentioned in paragraphs [0025] and [0026] of the patent, were novelty-destroying for the subject-matter of claim 4.

The board disagrees. It is not disputed that apple fruit products such as apple juice comprise on the one hand fructose, the typical sugar in fruits, and on the other hand phloretin, a 4-hydroxydihydro-chalcone. However, paragraph [0026], in particular page 6, lines 40-50), discloses:

*"In so far as phloretin occurs as the free compound in certain natural products, e.g. apple products, the precursor glycoside phloridzin is also always present alongside it. Normally, the phloretin content is clearly below 10 ppm, e.g. up to a maximum of 1.1 ppm in stewed apple ... or 0.3 - 7 ppm in apple wine ... The proportion of phloridzin is then regularly the greater by one or more orders of magnitude. The use of phloridzin in preparations according to the invention, however, is not desirable because phloridzin has a very bitter taste ... Moreover, the natural total polyphenol content in phloretin/phloridzin-rich apple products is altogether high ...; the associated catechins ... phenolic acid derivatives ... and flavones ... however, are known to cause a bitter and/or astringent taste, which may have a negative influence on the sweetness of the product",*

and paragraph [0027] states in relation to phloridzin (a glycoside of phloretin: paragraph [0024], page 6, lines 25-26):

*"All in all, the use of glycosides of 4-hydroxydihydrochalcones of the formula (I) (or their salts) is not preferred according to the invention".*

Thus according to the patent in suit, the apple juice compositions known in the art do not contain a total amount of phloretin sufficient to enhance the impression of a sweet taste of a sweet-tasting substance, and therefore they do not fulfil the requirement of feature 5 of claim 4.

4.7 In view of the above, the board concludes that the subject-matter of claim 4 is novel over the cited prior art.

## **5. Inventive step**

The appellant disputed the inventive step of independent claims 1 and 4 of the main request. Each of these claims will be dealt with separately.

5.1 Claim 1 - The closest prior art

5.1.1 The subject-matter of claim 1 relates to the use of a specific 4-hydroxydihydrochalcone or a salt thereof to enhance the sweet taste of a sweet-tasting substance or the impression of a sweet smell of a flavouring that gives an impression of a sweet smell (section IX above).

5.1.2 D3 relates to the enhancement of the sweetness of the sweetening agent 2,4,6,3'-tetrahydroxy-4'-

methoxydihydrochalcone (THMDHC) by combining or interacting it with an organic compound which contains one or more electron-donating functioning groups, particularly amino and hydroxyl groups (column 1, line 55 to column 2, line 5; column 2, lines 33-43). The preferred organic compound is a polyhydroxy-containing organic compound, such as a polyol and a polyhydric alcohol represented by, but not limited to, a sugar alcohol such as sorbitol, mannitol or xylitol (column 2, lines 6-20 and column 3, lines 59-61). The polyhydric alcohols of D3 typically have little sweetening *per se* in comparison to sucrose, but when combined with THMDHC the composition has an enhanced sweetening power (column 3, line 68 to column 4, line 5). Thus, D3 lies in the technical field of the invention of claim 1 of the main request, namely that of sweetener compositions/preparations providing enhanced sweetness, and is considered as the closest prior art. Both parties acknowledged D3 as the closest prior art.

5.1.3 The subject-matter of claim 1 of the main request differs from the disclosure of D3 in the chemical structure of the 4-hydroxydihydrochalcone. According to claim 1 the substituent at position 4 of ring B is a -OH whereas in D3 it is disclosed to be a -OCH<sub>3</sub>.

5.2 Claim 1 - The technical problem and its solution

5.2.1 According to the respondent, the technical problem to be solved by the patent in suit is to find substances that are selectively suitable for enhancing the sweet taste of sweet-tasting substances and/or enhancing the impression of a sweet smell of flavourings that give an impression of a sweet smell (see patent in suit: paragraph [0008]).

- 5.2.2 The experimental part of the patent in suit provides adequate evidence that the technical problem has successfully been solved by the use of the 4-hydroxydihydrochalcones as defined in claim 1. The table of paragraph [0102] shows that the addition of the 4-hydroxydihydrochalcone phloretin in amounts of only 30 ppm to a 5% solution of a sweet-tasting substance such as sucrose or glycerin enhances the impression of sweetness of the sweet-tasting substance.
- 5.2.3 The appellant disputed the effect shown in the above table on the ground that the sweetness was not measured according to a reproducible test method. The board does not agree. Paragraph [0102] discloses that sweetness of the tested solutions was determined by a group of experts which classified the sweetness using a scale of 0 to 10 (0 stood for extremely weakly sweet and 10 for extremely sweet). The use of a panel of experts for the evaluation of a sensory property is standard in the art. The scale used is also customary. The results of the sweetness determination in example 1 (without or with phloretin) must be considered in relation to each other, since the aim of the test is to reveal if there is a sweetness enhancement, and not in absolute values of sweetness, the latter depending on the panel of experts. The comparison shows a clear enhancement of the impression of sweetness when in a 5% solution of sucrose or glycerine 30 ppm of phloretin is added. Furthermore, this test is not invalidated because the calculated enhancement is not always quantitatively the same: in the table of paragraph [0102] the enhancement is calculated to be 31% whereas in the table of paragraph [0103] it is 22% for the same sugar and the same amount of phloretin. These results undeniably show a qualitative trend when phloretin is added to the sugar, which is sufficient to adequately prove that

sweetness enhancement takes place. Thus this assertion of the appellant must fail.

- 5.2.4 The appellant also disputed the validity of the shown effect (enhancement of the sweet taste of a sweet-tasting substance) since the sweetness of the phloretin *per se* was not mentioned in the table of paragraph [0102]. However, the patent discloses on page 8, lines 48-50, that:

*"In low concentrations (compare the preferred concentrations for use given below) the 4-hydroxydihydrochalcones of the formula (I) or their salts to be used according to the invention exhibit only a very slight taste of their own"*

and on page 8, lines 54-56, that:

*"Preferred concentrations in this case are less than 0.01 wt.%, (100 ppm) preferably less than 0.006 wt.% (60 pm) in particular less than 0.004 wt.% (40 ppm), more preferably in the range 1 to 30 ppm and most preferably in the range 10 to 30 ppm".*

In view of these statements, it is clear that phloretin at a concentration of 30 ppm was not expected to make any contribution to the sweetness of the preparations of the table of paragraph [0102]. However, the presence of phloretin in these preparations enhanced the sweetness of the sugar solution (the sweet-tasting substance), since the sweetness of the preparation was stronger than the sweetness of the sugar alone. The enhancement can be considered to derive from the synergy of the phloretin with the sugar.

Thus, the technical evidence demonstrates that the above-mentioned problem has been solved by the measures taken.

5.3 Claim 1 - Obviousness

5.3.1 The skilled person starting from D3 and looking for an alternative 4-hydroxydihydrochalcone to be used for enhancing the sweet taste of sweet-tasting substances or enhancing the impression of a sweet smell of flavourings that give an impression of a sweet smell would not find in the art the motivation to use a 4-hydroxydihydrochalcone according to claim 1 instead of the 4-hydroxydihydrochalcone of D3.

5.3.2 **D8** discloses 4-hydroxydihydrochalcone derivatives, namely 4-hydroxydihydrochalcone with a glycoside residue such as naringin dihydrochalcone (example 1) and prunin dihydrochalcone (example 3) whose 4-hydroxydihydrochalcone structure is the same as that of the 4-hydroxydihydrochalcone of claim 1. Although these derivatives are used as sweetening agents in food products (column 1, lines 17-44; column 3, lines 49-54; claim 1), they are not disclosed to enhance the sweetness of sweet-tasting substances. Therefore, the skilled person would not find any motivation in D8 to use these derivatives as sweetness enhancers of sweet-tasting substances and would not have used them in D3 instead of the THMDHC 4-hydroxydihydrochalcone. Even more importantly, the sweetening properties of the 4-hydroxydihydrochalcone derivatives of D8 are based on the nature of the glycosyl radical (column 2, lines 17-24) and on its position on ring A of the compound (column 2, lines 29-40), which means that the skilled person would have no reason to convert the dihydrochalcone glycoside of D8 to the dihydrochalcones

of claim 1. Thus even if the skilled person had combined D3 with D8, he would not have arrived at the subject-matter of claim 1.

5.3.3 The appellant stated that since the patent in suit discloses that **phloretin** was a known 4-hydroxydihydrochalcone present in natural products (paragraphs [0024]-[0026]), phloretin belonged to his common general knowledge. The appellant further asserted that the skilled person would obviously have replaced the 4-hydroxydihydrochalcone of D3 with phloretin to enhance the sweetness of sweet-tasting substances. This objection is made with knowledge of the invention; the fact that phloretin was a known compound does not hint at its use to replace the 4-hydroxydihydrochalcone used in D3.

#### 5.4 Claim 1 - Conclusion

In view of the above, the skilled person would not have arrived at the subject-matter of claim 1 in an obvious manner by the combination of the teaching of D3 with the teaching of D8 or with the common general knowledge in the field. Therefore the subject-matter of claim 1 of the main request involves an inventive step.

#### 5.5 Claim 4 - The closest prior art

5.5.1 The subject-matter of claim 4 relates to a preparation used for nutrition, oral hygiene or pleasure (i.e. suitable to be used for nutrition, oral hygiene or pleasure) which contains, on the one hand, a specific 4-hydroxydihydrochalcone or a salt thereof and, on the other hand, at least one other sweet-tasting substance and/or one or more flavourings that give the impression of a sweet smell, the amount of the first component in



the preparation varying in the range 1 to 50 ppm and being sufficient to enhance to an overproportional extent the impression of a sweet taste of the sweet-tasting substance or the impression of a sweet smell flavouring that gives an impression of a sweet smell (section IX above).

5.5.2 For the reasons given in section 5.1.2 above, D3 is still considered to represent the closest prior art. This was acknowledged by the respondent.

5.5.3 The appellant argued for the first time during the oral proceedings that D2 was the closest prior-art document. Despite the fact that this line of argumentation was late-filed, it was discussed by the parties during the oral proceedings. The board concurs with the respondent that D2 is more remote than D3 and is not the most appropriate document for the assessment of inventive step. Although it is acknowledged that D2 discloses 4-hydroxydihydrochalcone compounds falling within the definition of the compounds of claim 4 and that these compounds have been used in eating-and-drinking and oral-care compositions and have structural similarities with the subject-matter of claim 4, they are disclosed in D2 to act as hyaluronidase inhibitors. This is different from the enhancement of the impression of sweetness dealt with in the patent in suit and D3. Thus D2 does not constitute the closest prior-art document.

The teaching of D3 is set out in section 5.1.2 above. D3 also discloses that the composition of the 4-hydroxydihydrochalcone THMDHC with a sugar alcohol such as sorbitol, mannitol, xylitol is useful as a sweetening agent in food and beverages (column 1, lines 55-60; column 3, lines 6-10 and 59-61) and that the sweetening composition is employed as an additive-

sweetening agent to edible products to effect sweetening typically from 0.0001% to 10% (i.e. 1-100,000 ppm) for example 0.001% to 0.05% (i.e. 10-500 ppm). The amounts of THMDHC used in the examples of D3 are at least 100 ppm.

5.5.4 The preparation for nutrition, oral hygiene or pleasure of claim 4 differs from that of D3 in that it comprises a different 4-hydroxydihydrochalcone compound.

5.6 Claim 4 - The technical problem and its solution

5.6.1 The technical problem underlying the invention of claim 4 in view of D3 is to provide an alternative preparation used for nutrition, oral hygiene or pleasure, whose total amount is sufficient to enhance to an overproportional extent the impression of sweet taste of a sweet-tasting substance or the impression of sweet smell of a sweet-smell flavouring.

5.6.2 The solution to this problem is solved by the features of claim 4, according to which the preparation comprises the 4-hydroxydihydrochalcone of structure (I), its salts or mixtures thereof, in amounts within the range of 1 to 50 ppm with respect to the total weight of the preparation.

5.6.3 The experimental part of the patent (table of paragraph [0102]) provides adequate technical evidence that the problem has been solved. Reference is made to sections 5.2.2 to 5.2.4 above.

5.7 Claim 4 - Obviousness

The skilled person starting from D3 and aiming at an alternative composition which enhances the impression

of sweet taste of a sweet-tasting substance or the impression of sweet smell of a sweet-smelling flavouring would not find any hint in the art to use a 4-hydroxydihydrochalcone compound as defined in claim 4 of the main request. Contrary to the assertions of the appellant, the skilled person would not find such a motivation in D8 or his general technical knowledge. Reference is made to sections 5.3.3 and 5.3.4 above.

5.8 Claim 4 - Conclusion

In view of the above, the subject-matter of claim 4 of the main request involves an inventive step.

6. Independent claims 10 and 12

With regard to the process of independent claim 10 (section IX above), and the 4-hydroxydihydrochalcone compound of independent claim 12 (section IX above), the board has come to the conclusion that they are novel and involve an inventive step for the reasons set out above in the context of claims 1 and 4. Since the appellant has not substantiated any objection against the subject-matter of these independent claims, there is no reason to elaborate further on their patentability.

7. Dependent claims

Dependent claims 2, 3, 5-9 and 11 of the main request relate to particular embodiments of the independent claims on which they depend. Therefore they are patentable *mutatis mutandis*.

## 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 12 filed as main request on 19 May 2016 during the oral proceedings, and with any necessary consequent amendments to the description.

The Registrar:

The Chairman:



M. Cañueto Carbajo

J. Jardón Álvarez

Decision electronically authenticated