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# Datasheet for the decision of 13 March 2007

**Case Number:** T 1215/05 - 3.3.09

**Application Number:** 99967519.2

**Publication Number:** 1139793

**IPC:** A23L 1/229

**Language of the proceedings:** EN

**Title of invention:**
Inhibitors of the bitter taste response

**Applicant:**
Mount Sinai School of Medicine of New York University

**Opponent:**
-

**Headword:**
-

**Relevant legal provisions:**
EPC Art. 54, 56

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

**Decisions cited:**
T 0002/81

**Catchword:**
-

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**Case Number:** T 1215/05 - 3.3.09

# D E C I S I O N
**of the Technical Board of Appeal 3.3.09**
**of 13 March 2007**

**Appellant:** Mount Sinai School of Medicine of New York University
One Gustave L. Levy Place
New York
NY 10029 (US)

**Representative:** Schwarz, Albin
Patentanwalt
Wipplingerstrasse 32/22
AT-1010 Wien (AT)

**Decision under appeal:** **Decision of the Examining Division of the European Patent Office posted 21 April 2005 refusing European application No. 99967519.2 pursuant to Article 97(1) EPC.**

**Composition of the Board:**

**Chairman:** J. Jardón Álvarez
**Members:** W. Ehrenreich
W. Sekretaruk

## Summary of Facts and Submissions

I. This appeal lies from the decision of the Examining Division, issued in writing on 21 April 2005, refusing European patent application No. 99 967 519.2, in the name of Mount Sinai School of Medicine of New York University, directed to "Inhibitors of the bitter taste response" and published as WO-A-00/38536 on 6 July 2000.

II. The decision under appeal was based on a set of eighteen claims filed with letter dated 11 March 2005.

Claim 1 read as follows:

"1. A method of inhibiting bitter taste in an ingestible product, said method comprising:

- providing an ingestible product which possesses a bitter taste and
- administering to a subject the ingestible product in conjunction with a bitter taste inhibitor, wherein the bitter taste inhibitor is selected from the group consisting of adenosine 5' monophosphate, thymidine 5' monophosphate, adenosine 5' diphosphate, adenosine 3' monophosphate, adenosine 5' succinate, adenosine 5' triphosphate, and adenosine 2' monophosphate, wherein the bitter taste inhibitor is administered under conditions effective to inhibit the bitter taste in the ingestible product."

Claims 2 to 18 were dependent claims.

III. According to the decision of the Examining Division, the claimed subject-matter was not novel and did not involve an inventive step, in the light of the disclosures of:

D5: US-3 647 482; and

D7: CH-497 136

In particular, the Examining Division held that the subject-matter of Claim 1 of the application lacked novelty in view of D7, which disclosed a method of inhibiting the bitter taste of fruits and vegetables and artificial sweeteners by adding adenosine-5'-monophosphate to the composition comprising the bitter tastant.

The Examining Division further held that the subject-matter of Claim 1 which was not anticipated by D7 lacked inventive step having regard to the disclosure of D5 or D7. The Examining Division considered that D5, which disclosed that ribonucleotides were able to eliminate the bitter taste of saccharin, was the closest prior art document. The objective problem to be solved by the application was then seen as to provide alternative methods to inhibit the bitter taste of saccharin. In its opinion, no inventive step could be seen in selecting one of the specific ribonucleotides now claimed from the teaching of D5. The Examining Division arrived at the same conclusion starting from D7 as the closest prior art document. In the absence of a particular effect, no inventive step could be acknowledged in the selection of certain specific compounds.

IV. The Notice of Appeal was filed on 30 June 2005 and the appeal fee was paid on the same day. The statement setting out the Grounds of Appeal and including three new sets of amended claims was filed on 31 August 2005. With said statement the Appellant also filed experimental evidence in support of its arguments.

V. On 1 December 2006 the Board dispatched the summons to attend oral proceedings. In the annexed communication pursuant to Article 11(1) of the Rules of Procedure of the Boards of Appeal, the Board gave its preliminary opinion that the main request did not fulfil the requirements of Article 123(2) EPC. The Board further drew the attention of the Appellant to the points to be discussed during the oral proceedings.

VI. In preparation for the oral proceedings, the Appellant by a letter dated 13 February 2007, submitted amended sets of claims for four new requests, namely a main request and three auxiliary requests. It also filed further experimental data.

VII. During the oral proceedings held on 13 March 2007, the Appellant withdrew all its previous requests and filed a new main request. Claim 1 of this request reads as follows:

"1. A method of inhibiting bitter taste in a substance which may come in contact with taste tissue, selected from foods, beverages, pharmaceuticals, dental products, cosmetics, wetable glues used for envelopes and stamps, soaps, shampoos, and toxic compositions used in pest control,

the method comprising incorporating into the substance 1 to 50 mM of a compound selected from adenosine 5' monophosphate, thymidine 5' monophosphate, adenosine 5' diphosphate, adenosine 3' monophosphate, adenosine 5' succinate, adenosine 5' triphosphate, and adenosine 2' monophosphate."

VIII. In essence, the Appellant's arguments may be summarized as follows:

– D7 did not disclose a method as now claimed because the disclosure of D7 indicated that the maximal amount of nucleotide added should be less than 0.003 % by weight of the fruit or vegetable product to avoid tasting the nucleotide. The method according to Claim 1 required the incorporation of 1 to 50 mM of the bitterness inhibitor, the lower amount now used corresponding to 0.034722 % by weight (calculation based on adenosine-5'-monophosphate) and therefore above the amount used in D7.

– Concerning inventive step, the Appellant submitted that the selection of the claimed bitter taste inhibitors and the claimed dosage ranges involved an inventive step. The experimental evidence in the application and the further evidence filed during the appeal proceedings showed that not every ribonucleotide covered by D5 and D7 was an effective taste inhibitor. Moreover, the claimed bitter taste inhibitors showed unexpected properties as they not only inhibited bitter taste but also enhanced flavour.

IX. The Appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of claims 1 to 15, filed 13 March 2007.

## Reasons for the Decision

1. The appeal is admissible.

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

2.1 Amended Claim 1 is based on originally filed Claim 40 which was directed to a method of inhibiting a bitter taste in a composition by incorporating an amount of a bitterness inhibitor. It has further been amended as follows:

- the composition has been defined as a substance which may come in contact with taste tissue in accordance with page 17, line 15 of the originally filed description, said substance has been selected from foods, pharmaceuticals, dental products, cosmetics, wetable glues used for envelopes and stamps (support page 17, lines 15 to 16); beverages (support page 5, line 21); and soaps, shampoos and toxic compositions used in pest control (support page 20, lines 15 to 16 of the description);

- the bitterness inhibitor is selected from the inhibitors disclosed in originally filed Claims 41 to 47; and

- the amount of inhibitor present is defined by a new range (1 to 50 mM), which is formed by combining the

general range of 0.01 - 50 mM disclosed on page 18, line 2 of the description with the preferred range of 1 to 5 mM mentioned on page 18, lines 5 to 30 for each specific inhibitor claimed. Such a range is according to the established jurisprudence of the Boards of Appeal unequivocally derivable from the original disclosure of the application and thus supported by it (see T 2/81, OJ EPO 1982, 394, point 3).

2.2 The remaining claims are also supported by the original disclosure:

Dependent Claims 2 to 14 merely specify the nature of the substance which may come in contact with the taste tissue, the bitter taste inhibitor and its amount, and are supported by the same passages mentioned above for Claim 1.

Dependent Claim 15, which is directed to the method of Claim 1 wherein the bitter taste inhibitor sweetens the substance, is supported for instance by page 19, lines 25 to 27.

2.3 Therefore, the subject-matter of the claims meets the requirements of Article 123(2) EPC.

3. *Novelty (Article 54 EPC)*

3.1 The Examining Division denied the novelty of the subject-matter of the then pending Claim 1 because document D7 disclosed the use of purine nucleotides such as adenosine-5'-monophospate for inhibiting the

bitter taste of fruits and vegetables (Claim 1 and column 2, lines 25 to 34).

3.2 The Appellant amended Claim 1 to specify that the bitterness inhibitor is present in a concentration of 1 to 50 mM. The percentage by weight for 1 mM adenosine-5'-monophosphate corresponds, on the assumption that the solution is aqueous, to 0.034722 % by weight.

3.3 The amount of bitterness inhibitor used in D7 is between 0.0003 % and 0.003 % by weight of the fruit or vegetable composition to avoid tasting of the nucleotide (see column 3, lines 44 to 54 and Claim 2).

The method according to amended Claim 1 differs from the disclosure of D7 by the use of an amount of bitterness inhibitor that is more than ten times the upper limit of D7.

3.4 Document D5 discloses a method of reducing the unpleasant aftertaste of a saccharin containing composition using a flavour modifier selected from the group consisting of ribonucleosides, ribonucleotides and their deoxy analogs (see Claim 1).

There is, however, no disclosure in D5 of a method of inhibiting bitter taste of a substance which may come in contact with taste tissue as now claimed using the specific inhibitors of Claim 1.

3.5 The subject-matter of Claim 1 is thus novel over the available prior art (Article 54 EPC).

4. *Inventive step (Article 56 EPC)*

4.1 Closest prior art

Document D7 represents the closest prior art document. As already discussed above in relation to novelty, it discloses the use of purine nucleotides as inhibitors of the bitter taste of fruits, vegetables and artificial sweeteners. According to this document the threshold limit value of the nucleotide to be added should be less than 0.003 % by weight of the fruit or vegetable product to avoid tasting the nucleotide.

4.2 Problem and solution.

4.2.1 The method according to Claim 1 of the present application differs from the method of D7 essentially by the use of a higher amount of bitterness inhibitor. The claimed method is further limited to the use of seven specific nucleotides, namely adenosine-5'-monophosphate (AMP), thymidine-5'-monophosphate, adenosine-5'-diphosphate, adenosine-3'-monophosphate, adenosine-5'-succinate, adenosine-5'-triphosphate, and adenosine-2'-monophosphate. From these selected nucleotides only AMP is mentioned in D7 as a possible bitterness inhibitor (column 2, line 26) but its use is not exemplified.

4.2.2 The present invention is based on the finding that selected nucleotides inhibit gustatory responses to bitter compounds while at the same time they do not affect responses to other compounds, like sodium chloride or sucrose.

The experimental results on page 23, line 19 to page 25, line 10 demonstrate that only specific compounds are able to inhibit gustatory responses to bitter compounds. Thus while AMP and the other compounds covered by Claim 1 diminish the gustatory responses to several bitter compounds (see Figures 1A - 1C for AMP, Figure 2 for the other compounds), other structurally close related nucleotides like guanosine-5'-monophosphate, adenosine-5'-carboxylate, adenosine-5'-monosulfate, etc. did not show this inhibitory effect (Figure 1E for GMP and Figure 2 for the other compounds).

During the appeal proceedings the Appellant stressed that while AMP inhibited the aversive response to bitter compounds, it did not affect the behavioural response to other compounds such as sucrose or sodium chloride (see Figure 3E). Thus, the use of the claimed bitterness inhibitors not only inhibits bitter taste, but also enhances flavour, improving the taste profile of the food.

The experimental evidence filed during the appeal proceedings confirmed these findings. Thus, the results filed with the statement setting out the Grounds of Appeal show that AMP reduces bitterness and increases saltiness and chicken flavour intensity in reduced sodium chicken broth containing potassium chloride, whereas the structurally close related inosine-5'-monophosphate does not reduce bitterness or increase saltiness and chicken flavour intensity in the same chicken broth. The further experimental evidence filed with letter dated 13 February 2007 indicates that AMP results in a significant increase of the perceived

sweetness of a carbonated soft drink containing saccharin and grapefruit juice.

4.2.3 The technical problem underlying the present application can thus be seen in the provision of a method of inhibiting bitter taste in a composition while also enhancing flavour of the composition and thus improving its taste profile.

4.2.4 This problem is solved by the claimed method using specific bitterness inhibitors in the amounts as specified in Claim 1.

4.2.5 The Board is satisfied that this problem has been credibly solved. The experimental results in the application and the further results submitted during the appeal proceedings as discussed above convincingly show that the use of the bitterness inhibitors covered by Claim 1 not only inhibits the bitter taste of food compositions but also enhances its flavour.

4.3 Inventive step

4.3.1 There is no hint to the advantageous properties of the selected compounds in D7. Moreover D7 teaches that the maximum amount of inhibitor to be used should be below 0.003 % by weight of the fruit composition. Contrary to the teaching of D7, the selected bitterness inhibitors covered by Claim 1 can be used in amounts well above this maximum amount without the nucleotide being tasted.

4.3.2 There is also no hint to said solution in D5. This document discloses a method for reducing the unpleasant aftertaste of artificial sweeteners using a flavour

modifier selected from ribonucleosides, ribonucleotides and their deoxy analogs, preferably if the sweetener and the flavour modifier are heat treated (see Claim 1 and abstract). There is no suggestion in this document that selected compounds covered by the general teaching of D5 could also have the above-mentioned advantageous properties.

4.3.3 For these reasons, the subject-matter of Claim 1, as well as the subject-matter of dependent Claims 2 to 15, involves an inventive step (Article 56 EPC).

5. For the reasons given above, the present claims can form the basis for grant. However, it remains necessary to adapt the description to the claims. This should be done before the Examining Division.

## Order

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

1. The decision under appeal is set aside.

2. The case is remitted to the Examining Division with the order to grant a European patent on the basis of Claims 1 to 15 dated 13 March 2007, after appropriate amendments to the description.

The Registrar: The Chairman:

P. Cremona J. Jardón Álvarez