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**Datasheet for the decision  
of 23 January 2025**

**Case Number:** T 0808/22 - 3.3.02

**Application Number:** 17772249.3

**Publication Number:** 3317260

**IPC:** C07D291/06, A23L27/30

**Language of the proceedings:** EN

**Title of invention:**

ACESULFAME POTASSIUM COMPOSITIONS AND PROCESSES FOR PRODUCING  
SAME

**Patent Proprietor:**

Celanese International Corporation

**Opponent:**

Hammer, Jens

**Relevant legal provisions:**

EPC Art. 54, 56, 123(2)

**Keyword:**

Amendments - allowable (yes)

Novelty - (yes)

Inventive step - (yes)



**Beschwerdekammern**

**Boards of Appeal**

**Chambres de recours**

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Case Number: T 0808/22 - 3.3.02

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.02**  
**of 23 January 2025**

**Respondent:** Celanese International Corporation  
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**Representative:** Grünecker Patent- und Rechtsanwälte  
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**Decision under appeal:** **Interlocutory decision of the Opposition  
Division of the European Patent Office posted on  
12 January 2022 concerning maintenance of the  
European Patent No. 3317260 in amended form.**

**Composition of the Board:**

**Chairman** M. O. Müller  
**Members:** P. O'Sullivan  
M. Blasi

## Summary of Facts and Submissions

- I. The appeal of the opponent (hereinafter appellant) lies from the decision of the opposition division according to which European patent 3 317 260 in amended form according to the then second auxiliary request met the requirements of the EPC.
- II. The following documents *inter alia* were submitted by the parties in opposition proceedings:
- D1 EP 0 215 347 A1
  - D2 CN 103130743
  - D2b Translation of D2
  - D4 CN 103613566 A
  - D4b Translation of D4
- III. In a communication pursuant to Article 15(1) RPBA, the board provided the preliminary opinion that claim 1 of the version considered allowable by the opposition division (then auxiliary request 1 in the appeal proceedings) met the requirements of Article 123(2) EPC and that the claimed subject-matter appeared to involve an inventive step starting from any of documents D1, D2, D3 or D4.
- IV. Oral proceedings by videoconference before the board took place as scheduled on 23 January 2025 in the presence of the appellant and the patent proprietor. At the end of the oral proceedings, the patent proprietor (hereinafter respondent) withdrew its appeal, with the consequences that it no longer relied on its main request (patent as granted) and that the opponent became the sole appellant. In appeal therefore, the

respondent solely defended the patent in amended form as considered allowable by the opposition division.

V. Requests relevant to the present decision

The appellant requested that the contested decision be set aside and that the patent be revoked in its entirety.

The respondent requested that the appeal be dismissed, i.e. that the patent be maintained as amended in the version considered allowable by the opposition division.

VI. For the relevant party submissions, reference is made to the reasons for the decision set out below.

**Reasons for the Decision**

Amended version of the patent considered allowable by the opposition division (main request in appeal)

The respondent's main request was that the appellant's appeal be dismissed, i.e. the highest ranking request was auxiliary request 2 underlying the decision under appeal and found allowable by the opposition division.

1. Amendments - Article 123(2) EPC

Independent claim 1 of the version considered allowable by the opposition division reads as follows:

*"A process for producing a finished acesulfame potassium composition, the process comprising the steps of:*

*(a) contacting a **chlorine-containing** solvent and a cyclizing agent to form a cyclizing agent composition;*

*(b) reacting an acetoacetamide salt with the cyclizing agent in the cyclizing agent composition to form a cyclic sulfur trioxide adduct; and*

*(c) forming from the cyclic sulfur trioxide adduct the finished acesulfame potassium composition comprising non-chlorinated acesulfame potassium and less than 35 wppm 5-chloro-acesulfame potassium;*

*wherein contact time from the beginning of step (a) to the beginning of step (b) is less than ~~60~~**15** minutes." (bold and strike through text respectively denoting addition and deletion compared to claim 1 of the application as filed)*

1.1 Claim 1 of the version considered allowable by the opposition division differs from claim 1 as filed in that the solvent in step (a) has been specified as a chlorine-containing solvent and in that the contacting time mentioned at the end of the claim has been amended from less than 60 minutes to less than 15 minutes.

1.2 The matter of dispute concerned the definition of the solvent as a "chlorine-containing" solvent in step (a)

of claim 1. The appellant argued that the application as filed provided no basis for this limitation in the context of claim 1 of the version considered allowable by the opposition division by the opposition division.

- 1.3 The board disagrees. As stated by the respondent, it is explained in the application as filed that by limiting the contact time of the cyclising agent and the solvent, fewer chlorosulphates are formed (paragraph [0029]). In paragraph [0030] it is stated that such chlorosulphate reaction products may be formed when a chlorine-containing solvent is employed (paragraph [0030]). In the view of the board, the chlorine-containing solvent mentioned in paragraph [0030] is unambiguously the solvent employed in step (a) of claim 1 of the application as filed, since solvents are not mentioned in any other context. Hence, the application as filed explicitly discloses this term.
- 1.3.1 The appellant's argument based on paragraph [0074] of the application as filed is also not convincing. As noted by the appellant, this paragraph, which concerns suitable solvents, refers to organic solvents including "halogenated aliphatic hydrocarbons", which is a more limited term than a "chlorine-containing solvent". In the view of the board however, paragraph [0074] does not contradict the earlier disclosure of "chlorine-containing solvent" in paragraph [0030], in particular since it is stated in paragraph [0074] that preferred solvents "include, but are not limited to" *inter alia* halogenated aliphatic hydrocarbons. Hence, the more broadly defined "chlorine-containing solvents" are not excluded by paragraph [0074].

- 1.3.2 The appellant also argued that there was no basis in the application as filed for the combination in claim 1 of the features "chlorine-containing solvent" and a contact time of less than 15 minutes.
- 1.3.3 The board also disagrees. As set out above, in claim 1 of the application as filed, it is specified that the contact time must be lower than 60 minutes. Basis for the restriction of this upper limit to 15 minutes as required in present claim 1 is provided in paragraph [0028] of the application as filed. As stated by the appellant, this paragraph discloses many different contact times and ranges of contact times, including "less than 15 minutes", with no preferences expressed. Hence, the choice of "less than 15 minutes" from the possibilities set out in paragraph [0028] represents a selection from a list, without any pointer to the specific choice of less than 15 minutes. It was a matter of dispute whether this selection was the only selection required, or whether another selection from a second list, namely the type of solvent, was necessary to arrive at the subject-matter of claim 1 of the version considered allowable by the opposition division.
- 1.3.4 The board decided this question in the negative. As stated by the respondent, the chlorosulphates generated by interaction of the solvent and the cyclising agent (paragraph [0029]) are necessary for the production of the impurity 5-chloro-acesulfame potassium, which the claimed process seeks to avoid (e.g. paragraph [0015]). It is not disputed that a prerequisite for the production of said chlorosulphates is the use of a chlorine-containing solvent. Therefore, insofar as the contact time is relevant in the application as filed, the broadest embodiment of the solvent is the

"chlorine-containing solvent" mentioned in paragraph [0030]. In the view of the board, the type of solvent does therefore not constitute a selection from a second list, but rather a limitation of the claim, in relation to the solvent, to the specific embodiment relevant to the issue addressed in the application as filed, namely the reduction in the amount of 5-chloro-acesulfame impurity by way of reduction in the contact time as stated in claim 1.

1.3.5 Consequently claim 1 fulfils the requirements of Article 123(2) EPC.

2. Novelty - Article 54 EPC

2.1 The appellant argued that the subject-matter of claim 1 lacked novelty over D1.

2.2 Patent document D1 concerns a process for the preparation of 6-methyl-3,4-dihydro-1,2,3-oxathiazine-4-one-2,2-dioxide (acesulfame) which involves the cyclisation of acetoacetamide-N-sulphonic acid or its salts by the addition of SO<sub>3</sub>. The examples of D1 disclose the preparation of acesulfame potassium. In example 1 (page 21, lines 31-37), a solution of triethylammonium-acetoacetamide-N-sulphonate (an acetoacetamide salt according to present claim 1) and sulphur trioxide (a cyclising agent according to claim 1) were simultaneously added to dichloromethane as solvent. The cyclic adduct was then neutralised with a potassium base, corresponding to step (c) of present claim 1 (D1, example 1, page 22, line 30 - page 23, line 3).

- 2.3 It was a matter of dispute between the parties whether D1 disclosed the requirement in claim 1 that the contact time from the beginning of step (a) to the beginning of step (b) is less than 15 minutes.
- 2.4 The appellant argued that in the first step of example 1 of D1 addressed above, the solvent, cyclising agent, and acetoacetamide salt were added together simultaneously and that this implied, in the terms of present claim 1, that steps (a) and (b) were carried out simultaneously, and the contact time referred to in claim 1 was therefore zero. Since, the claimed contact time of less than 15 minutes included zero, novelty was to be denied.
- 2.5 The board does not follow the appellant's interpretation of claim 1. First, as argued by the respondent, claim 1 explicitly sets out a process defined as comprising steps (a) to (c). While additional steps cannot be excluded, claim 1 requires a step (a) in which a cyclising agent "*composition*" is prepared. Step (b) then requires that an acetoacetamide salt is reacted with the cyclising agent "*in the cyclizing agent composition*". Therefore, it is implicit in claim 1 that a cyclising agent composition is first formed and only then reacted with an acetoacetamide salt. Since the cyclising agent composition necessarily must exist for a certain period, however short, before reaction thereof with an acetoacetamide salt, a contact time of zero is excluded from the scope of claim 1.
- 2.6 The appellant also argued that the interpretation of claim 1 which included an embodiment in which the contact time was zero was supported by the description, which explicitly disclosed such an embodiment, in particular in paragraph [0037]) of the patent.

2.7 The board cannot follow this view. Even if the description were to include such an embodiment as alleged by the appellant, it would be at odds with the clear language of claim 1 as set out above. Such a discrepancy between the description and the claim is however not a reason to ignore the clear linguistic structure of the claim and interpret it differently.

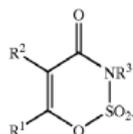
2.8 Therefore, at least for this reason, the subject-matter of claim 1 is novel over D1 pursuant to Article 54 EPC.

3. Inventive step - Article 56 EPC

3.1 The appellant submitted that the subject-matter of claim 1 lacked inventive step starting from any one of D3, D2, D4 or D1 as closest prior art, in combination with common general knowledge.

3.2 Starting from D3

3.2.1 Patent document D3 concerns a method for the production of 3,4-dihydro-1,2,3-oxathiazin-4-one-2,2-dioxide compounds of the following formula (2), or a salt thereof:



wherein R<sup>1</sup> and R<sup>2</sup> are defined as hydrogen or an organic group inert to the reaction.

The examples of D3 concern the preparation of a specific compound, namely 6-methyl-3,4-dihydro-1,2,3-oxathiazin-4-one-2,2-dioxide, which is acesulfame, the

anion of the salt acesulfame potassium. According to paragraph [0039], salts may be prepared. In particular when the anion is the compound of the examples, namely acesulfame, the preferred salt is the potassium salt, i.e. acesulfame potassium (paragraph [0042]).

### 3.2.2 Distinguishing features

It was undisputed that the subject-matter of claim 1 differs from example 1 of D3 in that the latter fails to disclose that

- the contact time of the chlorinated solvent and cyclising agent is less than 15 minutes while the contact time in D3 is not disclosed and
- the finished acesulfame potassium composition comprises less than 35 wppm 5-chloro-acesulfame potassium.

### 3.2.3 Objective technical problem

The appellant argued that the opposed patent itself showed that an impurity level of less than 35 wppm could be achieved with a contact time of 1 hour (patent and application as filed, example 2), i.e. outside the scope of claim 1. Therefore, the claimed contact time of less than 15 minutes was not critical, and no technical effect could be acknowledged. The objective technical problem was hence the provision of an alternative process for the production of finished acesulfame potassium.

The board disagrees. In relation to the technical effect of the distinguishing features, as argued by the respondent, the examples of the patent and the application as filed credibly demonstrate that a

reduction in the contact time leads to lower levels of the impurity 5-chloro-acesulfame potassium in the product. Specifically, the 5-chloro-acesulfame potassium impurity level was reduced (see table 2 bridging pages 16 and 17) from 4960 wppm (20 days; comparative example A) to 78 wppm (5 days, comparative example C), 54 wppm (4 days; comparative example B), 32 wppm (1 hour; example 2) and finally to a non-detectable amount (< 5 minutes; example 1, table 2). Even if a purity level within the range defined in claim 1 can be achieved at contacting times above the upper limit of the claimed range as argued by the appellant, the fact remains that the lower contacting time as defined in claim 1 leads to an even higher purity.

Accordingly, the objective technical problem is the provision of an improved process for the preparation of acesulfame potassium with higher purity in terms of the amount of 5-chloro-acesulfame potassium.

#### 3.2.4 Obviousness

There is no motivation in D3, in the common general knowledge, nor in any other document, and none was identified by the appellant, according to which the skilled person would have been taught to solve this problem by selecting within D3, which is silent about the contact time, a contact time as stipulated in claim 1.

#### 3.2.5 Consequently, the subject-matter of claim 1 of the version considered allowable by the opposition division involves an inventive step in view of D3.

### 3.3 Starting from D2 (represented by translation D2b)

#### 3.3.1 Distinguishing features

D2b is the translation of Chinese patent document D2. It was uncontested that D2b represents the disclosure of D2. Reference is therefore only made to D2. D2 concerns a method for the preparation of acesulfame potassium (paragraph [0001]). In example 1 of D2, dichloromethane was added to a preparation kettle, after which sulphur trioxide was added. The time of addition is undefined. After the feeding of sulphur trioxide, the mixture was circulated for a further 20 minutes and the mixed solution was poured into a metering tank (paragraph [0011]). The sulphur trioxide solution and the "intermediate" were then added to the sulphonation reactor at the same time (paragraph [0012]).

As stated by the respondent, the "contact time" in D2 results from the sum of the sulphur trioxide addition time, the 20 minute circulation time and an undefined period in the metering tank prior to use in the sulphonation reaction.

Hence, D2 at least fails to disclose a contact time of less than 15 minutes as required by claim 1.

#### 3.3.2 Objective technical problem

The technical effect of the distinguishing feature is the same set out above for D3, namely that the claimed contact time is responsible for an improved, i.e. lowered content of the undesired impurity 5-chloro acesulfame potassium.

Hence, the objective technical problem is identical to that provided above starting from D3, namely the provision of an improved process for the preparation of acesulfame potassium with higher purity in terms of the amount of 5-chloro-acesulfame potassium.

There is no motivation in D2, in the common general knowledge, nor in any other document, and none was identified by the appellant, to solve this problem by reducing the contact time as stipulated in claim 1.

Consequently, the subject-matter of claim 1 involves an inventive step over D2 as closest prior art.

3.4 Starting from D4 (represented by translation of D4b)

3.4.1 Distinguishing features and objective technical problem

D4b is the translation of Chinese patent document D4. It was uncontested that D4b represents the disclosure of D4. Reference is therefore only made to D4.

D4 discloses a one-step continuous production method of acesulfame potassium (D4, paragraph 0001). The respondent conceded that D4 differs from claim 1 in that the claimed contact time is not disclosed.

Hence, similarly to D3, the technical effect of the distinguishing feature is that the claimed contact time is responsible for an improved, i.e. lowered content of the undesired impurity 5-chloro acesulfame potassium.

Hence, the objective technical problem may be formulated identically as for D3 and D2 above, namely as the provision of an improved process for the preparation of acesulfame potassium with higher purity

in terms of the amount of 5-chloro-acesulfame potassium.

#### 3.4.2 Obviousness

There is no motivation in D4, in the common general knowledge, nor in any other document, and none was identified by the appellant, to solve this problem by reducing the contact time according to claim 1.

Hence the subject-matter of claim 1 involves an inventive step over D4 as closest prior art.

3.5 Consequently, the subject-matter of claim 1 of the version considered allowable by the opposition division, and by analogy, dependent claims 2 to 10, involves an inventive step.

#### 3.6 Starting from D1

3.6.1 As set out above in relation to novelty of the subject-matter of claim 1, D1 concerns a process for the preparation of acesulfame. The examples of D1 disclose the preparation of acesulfame potassium by neutralisation of the cyclic adduct with a potassium base, corresponding to step (c) of present claim 1 (e.g. example 1, page 22, line 30 - page 23, line 3). In the first step of example 1 of D1 (page 21, lines 31-37), a solution of triethylammonium-acetoacetamide-N-sulphonate (an acetoacetamide salt according to present claim 1) and neat sulphur trioxide (a cyclising agent according to claim 1) were simultaneously added to dichloromethane as the solvent.

### 3.6.2 Distinguishing features

As stated above in relation to novelty of the subject-matter of claim 1 of the main request, the subject-matter of claim 1 is distinguished from example 1 of D1 at least by the claimed contact time, a contact time of zero as disclosed in example 1 of D1 (i.e. simultaneous addition of solvent, cyclising agent (SO<sub>3</sub>) and acetoacetamide salt) being excluded from the scope of claim 1.

As stated by the appellant, the feature of claim 1 according to which the finished acesulfame potassium composition comprises less than 35 wppm 5-chloro-acesulfame potassium is not a distinguishing feature over the product of example 1 of D1.

### 3.6.3 Objective technical problem

The appellant argued that the objective technical problem underlying claim 1 was the provision of an alternative process to that of example 1 of D1. However, as argued by the appellant itself (see above), example 1 of D1 yields acesulfame potassium having less than 35 wppm 5-chloro-acesulfame potassium. Therefore, this aspect must also be taken into account in the formulation of the objective technical problem.

Hence, the objection technical problem underlying claim 1 is the provision of an alternative process to that of example 1 of D1 for providing a high-purity acesulfame potassium composition in terms of the amount of 5-chloro-acesulfame potassium.

#### 3.6.4 Obviousness

The board agrees with the respondent that the claimed solution is not obvious in view of D1. Specifically, as an alternative to using neat liquid SO<sub>3</sub> according to example 1 of D1, and as stated by the appellant, D1 also proposes the use of SO<sub>3</sub> in dissolved form, specifically in a non water-miscible inert organic solvent (D1, page 14, lines 27-32). Such a solvent can be the same as used for the solution of the acetoacetamide salt (D1, paragraph bridging pages 14 and 15), and halogenated aliphatic hydrocarbons such as methylene chloride are preferred (D1, page 14, lines 15-16). Therefore, in order to arrive at the subject-matter of claim 1, in a first step, the skilled person would have been required to provide SO<sub>3</sub> in dissolved form as taught in the above-mentioned passages of the description of D3. However, having made this choice, and for the same reasons as provided for D3, D2 and D4 above, there is no motivation in D1, in the common general knowledge, nor in any other document, and none was identified by the appellant, to provide a contact time for SO<sub>3</sub> and the solvent as required by claim 1 to achieve a high purity acesulfame potassium in terms of the amount of 5-chloro-acesulfame potassium. As set out above, the examples of the patent demonstrate that the claimed contact time is necessary to obtain high purity acesulfame potassium and thereby provide an alternative process to that of example 1 of D1.

3.6.5 The subject-matter of claim 1 thus involves an inventive step starting from D1 as closest prior art.

3.7 Since there were no further objections against this request, the version considered allowable by the opposition division is allowable.

**Order**

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

The appeal is dismissed.

The Registrar:

The Chairman:



U. Bultmann

M. O. Müller

Decision electronically authenticated