Internal distribution code:

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

Datasheet for the decision of 23 April 2024

Case Number: T 2410/22 - 3.3.07

Application Number: 17772569.4

Publication Number: 3322695

IPC: C07D291/06

Language of the proceedings: EN

Title of invention:
ACESULFAME POTASSIUM COMPOSITIONS AND PROCESSES FOR PRODUCING SAME

Patent Proprietor:
Celanese International Corporation

Opponents:
Hammer, Jens
Anhui Jinhe Industrial Co., Ltd.

Headword:
Process for producing acesulfame potassium compositions / CELANESE

Relevant legal provisions:
RPBA 2020 Art. 12(6)
EPC Art. 56, 100(a), 123(2), 54(2), 83

Keyword:
Late-filed evidence - should have been submitted in first-instance proceedings (yes) - admitted (no)
Inventive step - main request (no) - auxiliary request 2 (yes)
Amendments - added subject-matter (no)
Novelty - (yes)
Sufficiency of disclosure - (yes)

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

Boards of Appeal

Chambres de recours

Boards of Appeal of the
European Patent Office
Richard-Reitzner-Allee 8
85540 Haar
GERMANY
Tel. +49 (0)89 2399-0
Fax +49 (0)89 2399-4465

Case Number: T 2410/22 - 3.3.07

D E C I S I O N
of Technical Board of Appeal 3.3.07
of 23 April 2024

Appellant: (Patent Proprietor)	Celanese International Corporation 222 W. Las Colinas Blvd., Suite 900N Irving, TX 75039 (US)
Representative:	Bird & Bird LLP Maximiliansplatz 22 80333 München (DE)
Appellant: (Opponent 1)	Hammer, Jens Leopoldstrasse 4 80802 München (DE)
Representative:	Grünecker Patent- und Rechtsanwälte PartG mbB Leopoldstraße 4 80802 München (DE)
Appellant: (Opponent 2)	Anhui Jinhe Industrial Co., Ltd. 127 East Street Lai'an County Anhui 239200 (CN)
Representative:	Cohausz & Florack Patent- & Rechtsanwälte Partnerschaftsgesellschaft mbB Bleichstraße 14 40211 Düsseldorf (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 30 August 2022 concerning maintenance of the European Patent No. 3322695 in amended form.**

Composition of the Board:

Chairman	A. Usuelli
Members:	E. Duval
	S. Ruhwinkel

Summary of Facts and Submissions

I. The appeals were filed by the patent proprietor (appellant-patent proprietor) and both opponents (appellant-opponent 1 and appellant-opponent 2) against the interlocutory decision of the opposition division finding that, on the basis of auxiliary request 9, the patent met the requirements of the EPC.

II. The decision was based on the patent as granted as the main request, on auxiliary requests 1-4 filed on 16 September 2021, auxiliary request 5 filed on 5 May 2022, auxiliary requests 6 and 7 filed (as auxiliary requests 5 and 6) on 16 September 2021, and auxiliary requests 8 and 9 filed on 5 May 2022.

Claim 1 of the main request (i.e. as granted) related to:
"A process for producing a finished acesulfame potassium composition, the process comprising the steps of:
(a) providing a cyclizing agent composition comprising a cyclizing agent and a solvent and having an initial temperature;
(b) cooling the cyclizing agent composition to form a cooled cyclizing agent composition having a cooled temperature ranging from -15°C to 25°C, wherein the cooled temperature is at least 2°C less than the initial temperature;
(c) reacting an acetoacetamide salt with the cyclizing agent in the cooled cyclizing agent composition to form a cyclic sulfur trioxide adduct composition comprising cyclic sulfur trioxide adduct, wherein the cyclization reaction time is less than 35 minutes; and

(d) forming the finished acesulfame potassium composition from the cyclic sulfur trioxide adduct, wherein the finished acesulfame composition comprises non-chlorinated acesulfame potassium and less than 39 wppm 5-chloro-acesulfame potassium."

Claim 1 of auxiliary request 4 additionally specified that "the providing step (a) comprises the step of contacting the solvent and the cyclizing agent to form the cyclizing agent composition, and wherein a contact time from the beginning of the contacting step to the beginning of reacting step (c) is less than 60 minutes".

Claim 1 of auxiliary request 9 differed from claim 1 of auxiliary request 4 in that "the solvent is dichloromethane".

III. The following documents were cited in the appealed decision:

D1: US-A-2005/0182255
D2: US-A-2009/0318685
D3: US 4,607,100
D4: CN-A-103130743
D4a: Computer-generated English translation of D4
D5: CN-A-1323792
D5a: Computer-generated English translation of D5
D6: DE 35 27 070 A1
D7: EP 0 218 076 A1
D8: Experimental Report dated 21 April 2021

IV. The opposition division decided the following:

(a) Regarding the main request, the combination of features of claim 1 did not introduce added

subject-matter. The requirements of sufficiency of disclosure were met. Neither D1 nor D2 disclosed the preparation of acesulfame potassium (Ace-K) after the steps of cooling the cyclizing composition and the cyclization, such that the criteria of novelty were fulfilled.

However, starting from D2 as closest state of the art, the problem was the mere provision of a further process for producing Ace-K. The solution proposed in claim 1, which allowed for the use of a non-chlorinated solvent and wherein no restrictions as regards the contact time was specified, represented an obvious alternative to the process disclosed in D2. Hence, neither the main request, nor, for the same reasons, any of auxiliary requests 1-8, met the requirements of inventive step.

(b) Auxiliary request 9 met the requirements of Article 123(2) and (3) EPC. Regarding inventive step, starting from D2, the differentiating features pertained to the neutralization reaction after cyclization, the contact time, and the nature of the impurities. The problem was the provision of an improved process for the preparation of Ace-K with an advantageous impurity profile. The claimed solution involved an inventive step.

V. In appeal, the appellant-patent proprietor defended their case on the basis of the patent as granted as main request and filed auxiliary requests 1-5 with their grounds of appeal.

Auxiliary requests 1 and 2 correspond respectively to auxiliary requests 4 and 9 underlying the decision (see II. above).

VI. With their grounds of appeal, appellant-opponent 2 filed the following documents D9 and D10:

D9: Boehshar, M.; Burgard, A., "5-Chloro acesulfame K – a characteristic indicator for application of the "sulfur trioxide" process in the manufacture of Acesulfame K", Research disclosure database number 477036, Published in the January 2004 paper journal

D10: E.E. Gilbert, "Liquid sulfur trioxide", Chem. Eng. News 67 (41), 2 (1989)

VII. The Board issued a communication under Article 15(1) RPBA setting out its preliminary opinion.

VIII. Oral proceedings were held before the Board by videoconference.

IX. The parties' requests were the following

(a) The appellant-patent proprietor requested that the decision under appeal be set aside and that the patent be maintained as granted, or, subsidiarily, that the patent be maintained on the basis of one of the auxiliary requests 1-5 filed with the statement setting out the grounds of appeal.

The appellant-patent proprietor further requested that neither D9 and D10, nor the attacks of lack of inventive step based on D2 + common general knowledge, D2 + D9/D10, D6 + D9/D10, D7 + D9/D10

and D7 + D2 be admitted into the appeal proceedings.

(b) Both appellants-opponents requested that the decision under appeal be set aside and that the patent be revoked in its entirety.

X. The appellant-patent proprietor's arguments may be summarised as follows:

(a) Admittance of D9 and D10

The appellant-opponent 2 should have filed these documents in the first instance proceedings. The filing of D9 and D10 could not aim at filling the gaps in the appellants-opponents's argumentation in the first instance proceedings, since they had only argued that the contact time of less than 60 minutes was implicitly disclosed in D2, D6 and D7. Accordingly, D9 and D10 were not to be admitted into the proceedings.

(b) Admittance of the objections to inventive step starting from D2 in combination with common general knowledge or starting from D7 in combination with D2

The attacks based on D7 and D2 were not raised at the oral hearing and therefore were not maintained. They should consequently not be admitted pursuant to Article 12(6) RPBA.

(c) Novelty and inventive step, main request and auxiliary request 1

D1 and D2 did not disclose a cooled temperature of the cyclizing agent composition in step (b) at least 2°C less than its initial temperature, nor, in combination with the other features of the examples, a neutralization step in which the sweetener acid is converted to Ace-K, nor a content of less than 39 wppm of 5-Cl-Ace-K as required by the claim.

Since the solvent in step (a) was not specifically defined, claim 1 of the main request and of auxiliary request 1 covered non-chlorinated solvents on the one hand and chlorinated solvents on the other. Starting from D2 as closest prior art, both parts solved the technical problem of reducing or eliminating the formation of 5-Cl-Ace-K in the production of Ace-K. The claimed solution was not rendered obvious by the prior art.

(d) Auxiliary request 2

Added subject-matter:

Considering that the reaction time of less than 35 minutes was the broadest range shown in paragraph [0044] of the application as filed, that the contact time was shown in aspect 3 in paragraph [0112], and that dichloromethane was the most preferred solvent in paragraph [0080], the cooled temperature of -15°C to 25°C, even if seen as a selection from a list of alternative embodiments, would not infringe Article 123(2) EPC.

Sufficiency of disclosure:

The patent gave a clear guidance how to carry out the claimed process, both in the general description and in the experimental section. The experimental report D8 represented no relevant evidence to challenge the data disclosed in the patent, considering the implausibly high concentrations of 5-Cl-Ace-K in all examples of D8, suggesting the use of extreme conditions.

Inventive step:

Starting from D2 as the closest prior art, the claimed subject-matter additionally differed by a contact time of less than 60 minutes. The experimental data of the patent (see table 1, examples 1 and 2) clearly showed a link between contact time and concentration in 5-Cl-Ace-K in the finished acesulfame potassium composition. The problem to be solved starting from D2 was the provision of a process for preparing Ace-K wherein 5-Cl-Ace-K is eliminated or reduced. The claimed solution involved and inventive step.

XI. The appellants-opponents' arguments may be summarised as follows:

(a) Admittance of D9 and D10

There had been no reason to file D9 and D10 in the first instance proceedings, because the opposition division had not clearly stated whether the contact time was implicitly disclosed in D2 or not. The filing of D9 and D10 was furthermore justified as a reaction to a new argument presented during the oral proceedings in first instance and adopted in the decision. Lastly, the content of D9 and D10 was

prima facie highly relevant and would have been known to the skilled person. Accordingly, D9 and D10 were to be admitted into the proceedings.

(b) Admittance of the objections to inventive step starting from D2 in combination with common general knowledge or starting from D7 in combination with D2

These objections had been raised in the first instance proceedings and addressed in the decision under appeal, they were accordingly part of the appeal proceedings.

(c) Added subject-matter

The combination, in claim 1 of auxiliary request 2, of a cooled temperature of -15°C to 25°C, a cyclization reaction time of less than 35 minutes, the use of dichloromethane as solvent and a contact time of less than 60 minutes had no direct and unambiguous disclosure in the application as originally filed.

(d) Sufficiency of disclosure

From the examples and comparative examples provided in the patent, the skilled person did not get sufficient information how to arrive at a finished Ace-K composition containing less than 39 wppm of 5-Cl-Ace-K. The experimental report D8 reworking the examples of the patent showed that this impurity level was not achieved over the whole claimed scope.

(e) Novelty

The subject-matter of claim 1 of all requests was anticipated by D1 (see examples 1, 2, 5 and 7 together with general disclosure of the formation of the potassium salt in paragraphs [0002], [0038] and [0042]) and by D2 (example 1 together with paragraphs [0036] and [0040]).

(f) Inventive step

Regarding auxiliary request 2, starting from D2 as closest prior art, and even assuming that the contact time and the amount of impurity were not disclosed in D2, the technical problem was the provision of an alternative process for the production of a finished Ace-K composition. In order to allow a continuous flow process as described in D2, the skilled person would mix sulfur trioxide with dichloromethane with a short contact time and would arrive at the claimed subject matter. The claimed solution was thus obvious.

Alternatively, the claimed subject-matter was obvious starting from D3, D4, D5, D6 or D7.

Reasons for the Decision

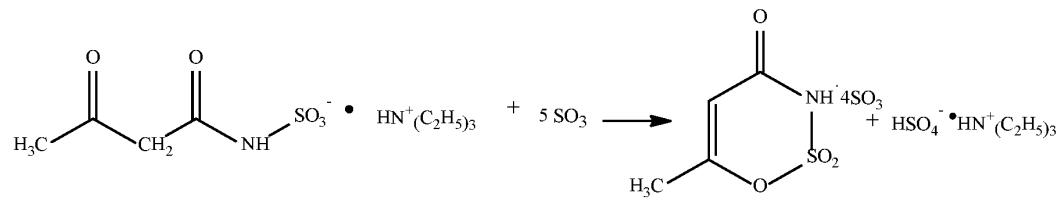
1. Technical background

The aim of the patent is to provide improved processes for producing high purity compositions of acesulfame potassium (Ace-K, a known sweetener) in which the formation of the impurity 5-chloro-acesulfame potassium

(5-Cl-Ace-K) during synthesis is reduced or eliminated (see paragraphs [0001] and [0011] of the patent).

The proposed solution according to claim 1 of the main request (see II. above) in appeal proceedings is a process comprising essentially the steps of:
(a) providing a composition comprising a cyclizing agent and a solvent;
(b) cooling the cyclizing agent composition;
(c) reacting an acetoacetamide salt with the cooled cyclizing agent composition to form a cyclic sulfur trioxide adduct; and
(d) forming the finished Ace-K composition from the cyclic sulfur trioxide adduct.

An exemplary cyclization reaction step (c), using sulfur trioxide (SO_3) as the cyclizing agent, is depicted in paragraph [0077] of the patent, reproduced below:



Claim 1 of auxiliary request 1 (i.e. auxiliary request 4 underlying the appealed decision) additionally specifies a contact time of less than 60 minutes. The contact time is defined in paragraph [0021] as the time period that the solvent contacts the cyclizing agent before formation of the cyclic sulfur trioxide adduct.

Claim 1 of auxiliary request 2 (i.e. auxiliary request 9 as upheld by the opposition division) further mandates that the solvent is dichloromethane.

2. Procedural matters

2.1 Admittance of D9 and D10 and of the objections of lack of inventive step based thereon

2.1.1 Appellant-opponent 2 submitted D9 and D10 for the first time with their statement setting out the grounds of appeal, and raises in appeal objections of lack of inventive step starting from D2, D6 or D7 in combination with these new documents D9 and D10.

D9 and D10 represent an amendment to appellant-opponent 2's case in the sense of Article 12(4) RPBA, to be admitted only at the discretion of the Board. In addition, under Article 12(6) RPBA, the Board shall not admit facts, objections or evidence which should have been submitted in the proceedings leading to the decision under appeal, unless the circumstances of the appeal case justify their admittance.

2.1.2 In appeal, appellant-opponent 2 relies on D9 and D10 as part of an objection that the feature relating to the contact time and its effect on the level of 5-Cl-Ace-K impurity do not involve an inventive step.

However, the feature relating to the contact time was already present in claim 3 of the granted patent as well as in claim 1 of the auxiliary request 4 filed in reply to the oppositions. Furthermore, the patent proprietor had already argued, in their reply to the oppositions dated 16 September 2021 (see §121-§124), not only that the contact time was a distinguishing feature over D2, but also that it had an unexpected effect on the 5-Cl-Ace-K impurity level.

During the opposition proceedings, in reply to the patent proprietor's submissions regarding the contact time, the opponents' sole rebuttal had been that this contact time was implicitly disclosed, in particular, in D1 and D2. The opponents never presented, at any point of the opposition proceedings, any argument or evidence to the effect that, if considered a differentiating feature, this contact time and its effect would be obvious.

Thus, appellant-opponent 2's filing of D9 and D10 cannot be regarded as an attempt to fill in gaps in their previously submitted inventive step argumentation. Instead, this filing represents a departure from their earlier case, which, considering the circumstances described above, should have been submitted during the first instance proceedings.

2.1.3 According to appellant-opponent 2, the filing of D9 and D10 would be in reaction to a new argument presented by appellant-patent proprietor during the oral proceedings before the opposition division (see the minutes of the oral proceedings, page 5, 7th paragraph) and adopted by the opposition division in their decision. This argument would be that, *even if the contact time would be regarded to be implicitly disclosed*, the associated effect would not be disclosed in the prior art. This argument would thus differ from appellant-patent proprietor's earlier submissions that the contact time *was* a differentiating feature.

The Board does not share this view. The appellant-patent proprietor consistently relied on the effect achieved by the contact time. The above subtle change in appellant-patent proprietor's position on whether this contact time is a differentiating feature cannot

justify that evidence regarding the effect of the contact time be filed for the first time in appeal. Furthermore, the Board does not share appellant-opponent 2's position that the opposition division adopted this new argument in their decision: the appealed decision clearly concludes, in the contest of inventive step, that the difference over D2 "resides in that the neutralization reaction is not disclosed after cyclization *and in that the contact time is not given*" (see §4.4.3 of the decision, emphasis added by the Board), in other words that the contact time is a differentiating feature.

2.1.4 Appellant-opponent 2 finally argued that D9 and D10 should be admitted on account that their content must be known to the skilled person, in view of D9's publication 12 years before the relevant date of the patent and its relevance to the topic of Ace-K impurities, and because D10 was evidence of common general knowledge.

The Board is not convinced by this argument. D9 and D10 are, respectively, a research disclosure and a short letter, both published in scientific journals. Neither D9 nor D10 are suitable evidence of the skilled person's common general knowledge. Furthermore, their filing is in any case to be seen as an attempt to make a fresh case in appeal and to raise new inventive step combinations based on new evidence. Even if it were accepted *arguendo* that D9 and D10 are *prima facie* relevant, the present circumstances do not justify that this fresh case be admitted in appeal under Article 12(6) RPBA.

2.1.5 In conclusion, neither D9 and D10, nor, consequently, any of the inventive step attacks based thereon, are

admitted into the appeal proceedings, pursuant to Article 12(6) RPBA.

2.2 Admittance of the objections to inventive step starting from D2 in combination with common general knowledge or starting from D7 in combination with D2

The objections of lack of inventive step starting from D2 in combination with common general knowledge, or starting from D6 or D7 in combination with D2, were presented in the first-instance proceedings and addressed in the appealed decision (see e.g. §2.5). The possibility that some of these objections were not repeated during the oral proceedings before the opposition division is not construed as an abandonment of these objections. Accordingly, these objections are considered to be part of the appeal proceedings.

3. Main request (patent as granted)

3.1 Novelty

3.1.1 D1 (see examples 1, 5 and 7) and D2 (see example 1) disclose a process comprising:
- dissolving a cyclizing agent (sulfuric anhydride, i.e. sulfur trioxide SO_3) in a solvent (dichloromethane), and cooling this cyclizing agent composition to a temperature in the claimed range of -15 to 25 °C (namely 4 °C, 3 °C or -10 °C).
- reacting an acetoacetamide salt (triethylammonium acetoacetamide-N-sulfonate) with the cyclizing agent composition at -30 °C to form a cyclic sulfur trioxide adduct, which is then subjected to hydrolysis to form Ace-H (6-methyl-3,4-dihydro-1,2,3-oxathiazin-4-one-2,2-dioxide).

3.1.2 Considering the feeding time (calculated in the case of D1 based on the feeding rates and amounts of reactants given in the examples), the opposition division accepted that a cyclization reaction time of less than 35 minutes was disclosed in D1 and D2 (see §2.4.3 of the decision). In their reply dated 25 May 2023 (see §56), the appellant-patent proprietor contests that this feature is disclosed in D2, on the ground that the claimed cyclisation time is not the same as the residence time. The Board does not share the appellant-patent proprietor's view, because the feeding time of 10 min and the residence time of 5.1 seconds in example 1 of D2 together still remain well below 35 min.

The appellant-patent proprietor further contends that neither D1 nor D2 disclose that the cooled temperature of the cyclizing agent composition in step (b) is at least 2°C less than its initial temperature. However, in the Board's view, this would suppose that the cooling step explicitly mentioned in D1 or D2 is actually a cooling by a mere 1 °C, starting from initial temperatures of respectively 5 °C, 4 °C or -9 °C in examples 1, 5 and 7 of D1 and example 1 of D2. This is not a realistic reading of D1 and D2. Accordingly, this feature is implicitly disclosed in D1 and D2.

3.1.3 However, these examples of D1 and D2 show the formation of the acid form Ace-H of acesulfame, but do not disclose a conversion into the potassium salt Ace-K.

A step of conversion into Ace-K in combination with the features of these examples cannot be derived directly and unambiguously from the whole content of D1 or D2 either. Both D1 and D2 (see paragraphs [0002] and [0008] of D1, and [0001] and [0008] of D2) generally

pertain to processes for the preparation of compounds of formula (2), including salts and non-salt forms, among which Ace-H is a preferred alternative (see paragraphs [0042] of D1 and [0040] of D2). Consequently, the examples of D1 and D2 are representative of the general teaching of these documents, in the sense that they do not lack any further step to be in line with the content of D1 and D2 taken as a whole.

None of these documents specifically lead the skilled reader to modify examples 1, 5 and 7 of D1, or example 1 of D2, according to the alternative mentioned in paragraphs [0038]-[0039] of D1, or paragraphs [0036]-[0037] of D2, regarding the preparation of a salt of a compound of formula (2). Such a combination is also not directly and unambiguously derivable from the further mention in paragraph [0042] of D1 and paragraph [0040] of D2 that "some of their physiologically acceptable salts, such as salts with Na, K or Ca, are used as sweeteners in the food industry, of which a potassium salt is typically useful as Acesulfame (Acesulfame potassium)".

3.1.4 Accordingly, for this reason already, the criteria of novelty are met. It is consequently not necessary to decide whether D1 and D2 implicitly disclose the claimed level for the impurity 5-Cl-Ace-K.

3.2 Inventive step

3.2.1 The disclosure of D2 and the differentiating features are discussed above (see 3.1).

According to the appellant-patent proprietor, the subject-matter of claim 1 as a whole solves the

technical problem of reducing or eliminating the formation of 5-Cl-Ace-K in the production of Ace-K.

However, as explained in the appealed decision, claim 1 of the main request does not require that a chlorinated solvent (such as dichloromethane) be used. In case that a non-chlorinated solvent is used, the problem of formation of 5-Cl-Ace-K impurity does not arise at all (see §2.5.7 of the decision).

3.2.2 The appellant-patent proprietor counters that, since the solvent in step (a) is not defined, claim 1 necessarily cover two parts:
- firstly, the use of chlorinated solvents, in which case the experimental data of the patent would show a reduction in the formation of 5-Cl-Ace-K associated with the claimed temperature change of at least 2°C in cooling step (b), and
- secondly, the use of non-chlorinated solvents, which is also a solution to the same problem of reducing or eliminating the formation of 5-Cl-Ace-K, because non-chlorinated solvents do not lead to the formation of that impurity.

3.2.3 The Board does not share this opinion.

Claim 1 does not mention the use of a non-chlorinated solvent, but merely covers such embodiments as a result of its broadness, i.e. because it leaves the solvent undefined. Whilst the description of the patent (see paragraph [0092] conceptually mentions various solvents for the cyclisation reaction, among which non-chlorinated solvents, the patent neither exemplifies such alternatives nor hints that these non-chlorinated solvents could be considered as a means to solve the problem of reducing or eliminating the formation of 5-

Cl-Ace-K. In this respect, the disclosure of the patent does not go beyond the content of D2 (see paragraph [0020]), which also recites various chlorinated and non-chlorinated solvents. In the context of such non-chlorinated solvents, no contribution can be seen in the choice of the claimed parameters, to the extent that they would represent a differentiating feature over D2, because the 5-Cl-Ace-K impurity is not formed anyway. The patent in suit does not teach to avoid chlorinated solvents any more than D2. The Board concludes that a technical effect compared with D2 of reduction or elimination of the formation of 5-Cl-Ace-K cannot be taken into account for the whole scope of the claim.

3.2.4 For the above reasons, the technical problem starting from D2 is the provision of an alternative process for producing a finished Ace-K composition.

The conversion of the Ace-H product obtained in example 1 of D2 into Ace-K is suggested in paragraphs [0036]-[0040] of D2 and is thus obvious in light of D2 alone.

As to the claimed content in 5-Cl-Ace-K in the finished Ace-K composition below 39 wppm, the Board considers that this feature of claim 1 is in any case no more than a statement of the problem to be solved which, in the given circumstances, does not suffice to establish an inventive step. To the extent that the technical problem would correspondingly be defined, hypothetically, as the provision of a process leading to a finished Ace-K composition containing less than 39 wppm 5-Cl-Ace-K, merely specifying in claim 1 that the resulting finished Ace-K composition does contain less than 39 wppm 5-Cl-Ace-K does not render the claimed process inventive. The appellant-patent proprietor did

not argue for inventive step on the basis of this feature.

Accordingly, the main request does not involve an inventive step.

4. Auxiliary request 1, inventive step

Auxiliary request 1 corresponds to auxiliary request 4 underlying the appealed decision. Compared with the main request, claim 1 of auxiliary request 1 additionally specified that "the providing step (a) comprises the step of contacting the solvent and the cyclizing agent to form the cyclizing agent composition, and wherein a contact time from the beginning of the contacting step to the beginning of reacting step (c) is less than 60 minutes".

Claim 1 of auxiliary request 1 however still leaves the solvent undefined. Consequently, for the same reasons as for the main request (see 3.2.3 above), starting from D2, no technical effect of reduction or elimination of the formation of 5-Cl-Ace-K can be taken into account, such that the technical problem remains the provision of an alternative process for producing a finished Ace-K composition. The claimed solution is also obvious. The parameter additionally specified in claim 1 of auxiliary request 1, namely the contact time of less than 60 minutes, does not provide any contribution in the context of non-chlorinated solvent, where the problem of formation of 5-Cl-Ace-K does not arise anyway, and is thus regarded as arbitrarily selected. Accordingly, auxiliary request 1 does not meet the requirements of inventive step either.

5. Auxiliary request 2

Auxiliary request 2 corresponds to auxiliary request 9 upheld by the opposition division. Compared with the main request, claim 1 of auxiliary request 2 additionally mandates that the solvent is dichloromethane and that the contact time is less than 60 minutes.

5.1 Article 123(2) EPC

Compared with claim 1 as filed, claim 1 of auxiliary request 2 differs in that:
- in step (b), the temperature of the cooled cyclizing agent composition has been amended from "less than 35°C" to "from -15°C to 25°C";
- step (c) mandates that "the cyclization reaction time is less than 35 minutes";
- the solvent is limited to dichloromethane; and
- a contact time of less than 60 minutes is specified.

The Board agrees with the opposition division that auxiliary request 2 meets the requirements of Article 123(2) EPC, for the following reasons:

The feature pertaining to the cyclisation time of less than 35 minutes is disclosed in paragraph [0044] as one of the means to reduce or eliminate the formation of impurities such as 5-Cl-Ace-K, which impurity was already required in claim 1 as filed to be present in an amount of less than 39 wppm in the finished acesulfame composition (as noted by the opposition division, see §2.2.3 of the appealed decision). The upper limit of 35 minutes encompasses all further ranges and upper limits shown in paragraph [0044], and is the broadest value disclosed in the general context of a process leading to less than 39 wppm 5-Cl-Ace-K in

the finished Ace-K composition. No selection is involved in the incorporation of this general feature into claim 1.

Appellant-opponent 2 refers to paragraph [0031] of the application as filed, which mentions an embodiment wherein, as a result of employing "the aforementioned providing (or contacting), reacting, and forming steps", the crude Ace-K composition comprises 0.001-39 wppm 5-Cl-Ace-K, and the finished Ace-K composition comprises from 0.001-5 wppm 5-Cl-Ace-K. This passage, which is unspecific as to the actual steps and parameters used, does not link the cyclisation time of less than 35 minutes, or the specific temperature range of -15°C to 25°C, with a purity different from the claimed general upper limit of 39 wppm 5-Cl-Ace-K in the finished Ace-K composition, and thus does not lead to a different conclusion.

Dichloromethane is disclosed as the preferred solvent in the application as filed (see paragraph [0080] and all the examples).

Finally, the feature relating to the contact time of less than 60 minutes is disclosed as aspect 3 in paragraph [0112] generally, i.e. it is not presented in combination with any further feature. Additionally, and similarly to the feature regarding cyclisation time, reducing the contact time is disclosed as the second means to reduce or eliminate the formation of 5-Cl-Ace-K, the upper limit of 60 minutes being the broadest value considered in the application as filed (see paragraphs [0042] and [0043]).

Considering the pointers to the remaining features of claim 1 discussed above, the selection of the range -15

to 25°C from the alternatives listed in paragraph [0028] represents at most the only selection required to arrive at claim 1 of the main request, with the consequence that the requirements of Article 123(2) EPC are fulfilled.

5.2 Sufficiency of disclosure

Claim 1 of auxiliary request 2 relates to a preparation process and mandates that the resulting finished acesulfame composition comprises less than 39 wppm 5-Cl-Ace-K. This process is disclosed in details in paragraphs [0077]-[0108] and exemplified in paragraphs [0109]-[0118], where examples 1-4 are shown to lead to 5-Cl-Ace-K levels below 39 wppm (see table 1). In the Board's view, the patent as a whole thus provides sufficient guidance to achieve these low levels of the chloro impurity.

According to the appellants opponents, D8 shows that the technical effect of improved impurity level is not achieved over the whole claimed scope. The 5-Cl-Ace-K levels reported in D8 are indeed considerably higher than 39 wppm. The Board however shares the opposition division's position regarding D8 (see §2.3.4 of the decision). In particular, according to the description (see paragraphs [0018]-[0020]), the low 5-Cl-Ace-K levels are obtained not only by cooling the cyclizing agent composition, but also by limiting the contact time (defined in paragraph [0021] as the time period that the solvent contacts the cyclizing agent before formation of the cyclic sulfur trioxide adduct) so as to limit the formation of chlorine/chloride-containing compounds. In auxiliary request 2, claim 1 defines not only the step of cooling the cyclizing agent composition, but also limits this contact time. While

the contact time is reported in the examples of the patent (see table 1), no information is given in D8 (see table 1 of D8). Furthermore, according to section 3 of D8, the SO_3 solution was prepared by adding dichloromethane to a "solution of sulfur trioxide/ dichloromethane composition", which was thus prepared at an unknown point of time before cyclisation. This differs from the protocol indicated in paragraph [0110] of the patent. It is thus not shown that the contact time was controlled in D8.

Accordingly, D8 does not cast doubt on the possibility to achieve the claimed levels of 5-Cl-Ace-K based on the information in the patent. The criteria of sufficiency of disclosure are met.

5.3 Novelty

The subject-matter of claim 1 of auxiliary request 2 differs from the examples of D2 not only by step (d) of forming the finished Ace-K composition (as opposed to the preparation of Ace-H, see 3.1.3 above), but also by the contact time of less than 60 minutes (i.e. from the beginning of contacting the dichloromethane solvent with the cyclizing agent to the beginning of reacting step (c)).

D2 does not disclose a contact time, i.e. neither explicitly, nor, contrary to the appellants opponents' view, implicitly. D2 describes the preparation of a solution of SO_3 in dichloromethane and its cooling to -10 °C, but does not indicate the time between the beginning of the dissolution of SO_3 in dichloromethane and the beginning of the addition of the resulting solution to the cyclisation reactor. Firstly, a direct addition of the SO_3 solution, once prepared, into the

reactor cannot be assumed. Secondly, the time taken to prepare the SO_3 solution, which is not disclosed in D2, must be taken into account. Even if, in the examples of D2, both the SO_3 solution and the acetoacetamide salt solution are fed to a continuous flow reactor with short residence times, the preceding, separate preparation of the SO_3 solution may well have had to be initiated more than 60 minutes before reaction, especially considering the amounts of reactants involved, which cannot be regarded as very small. The fact that no delay is mentioned in D2 does not, at any rate, allow the conclusion that the SO_3 solution was directly used and that the contact time was inevitably below 60 minutes.

The subject-matter of claim 1 of auxiliary request 2 is novel over the similar disclosure of D1 for the same reasons.

5.4 Inventive step

Starting from D1, the differentiating features are as defined above (see 5.3), namely the step of forming the finished Ace-K composition, and the contact time of less than 60 minutes.

An effect of the contact time on 5-Cl-Ace-K levels is shown in table 1 of the patent by a comparison of examples 1 and 2: reducing the contact time from 60 min to 30 min leads to a lower amount of 5-Cl-Ace-K (23 wppm vs 32 wppm). Contrary to the appellants opponents' assertion, there is no evidence that example 1 and 2 differ in any respect other than the contact time. Although the reaction time is not explicitly given in said examples 1 and 2, paragraph [0113] of the patent indicates that in all examples the feed rate of the

reactants was controlled in such a way that the temperature of the reaction flask contents remained between -25° and -35 °C. There is accordingly no support for speculating that the reaction time was different. Lastly, since claim 1 of auxiliary request 2 limits the solvent to dichloromethane, the Board sees no reason to doubt that the above effect is achieved across the scope of the claim.

Consequently, the technical problem starting from D2 is to provide a process for preparing Ace-K wherein the formation of 5-Cl-Ace-K is eliminated or reduced.

According to the appellant opponents, in order to allow for the continuous flow process of D2, the times of preparing the solution of SO_3 dichloromethane must be short, since otherwise a continuous flow would not be possible. For the reasons given above, the Board considers that the addition of the SO_3 solution to a continuous flow reactor does not exclude the possibility that the SO_3 solution was prepared well in advance. In addition, the appellant opponents' reasoning does not address the fact that the effect of a short contact time on 5-Cl-Ace-K levels was unknown.

The further documents D3-D7 do not show either a contact time below 60 minutes, or its effect onto 5-Cl-Ace-K levels.

In particular, D4 (see the translation D4a) shows a continuous process for the preparation of Ace-K and mentions a reduction in the impurity content (see page 2, lines 70-71). However, D4 is silent not only on a step (b) of cooling the SO_3-dichloromethane composition before the cyclisation reaction, but also on the contact time. In this respect, the Board shares the

appellant-patent proprietor's view that the contact time in the process of D4 is not only the 20 minutes of circulation time, but its sum with the unknown SO_3 addition time and the unknown storage time in the metering tank before cyclisation reaction.

As to example 3 of D6 and example 1 of D7, the SO_3 composition is cooled to -30°C, i.e. outside the claimed range of -15°C to 25°C. In addition, D6 and D7 do not disclose a contact time, be it explicitly or implicitly. As for D1 and D2, there is no support for the appellants opponents' assumptions that the solution of SO_3 in dichloromethane, once prepared, was directly used in the cyclization reaction, and that the time between the beginning of contacting SO_3 and dichloromethane to the beginning of reacting step (c) was less than 60 minutes.

It follows that the skilled person, starting from D2 and seeking to reduce the amount of 5-Cl-Ace-K impurity formed during the process of preparing Ace-K, finds no incentive to consider a reduction of the contact time as a solution to this technical problem.

The appellants opponents also raised objections of lack of inventive step starting from D3, D4, D6 or D7. However, considering that none of these documents disclose a contact time below 60 minutes, or its effect onto 5-Cl-Ace-K levels, these objections must fail for the same reasons as set out above starting from D2.

Accordingly, auxiliary request 2 meets the requirements of inventive step.

Order

For these reasons it is decided that:

The appeals are dismissed.

The Registrar: The Chairman:

B. Atienza Vivancos A. Usuelli

Decision electronically authenticated