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Datasheet for the decision of 12 March 2008

Case Number: T 0138/06 - 3.3.10

Application Number: 00302130.0

Publication Number: 1041062

IPC: C07C 57/04

Language of the proceedings: EN

Title of invention:
Method for refining (meth)acrylic acid

Patentee:
NIPPON SHOKUBAI Co., Ltd.

Opponent:
BASF Aktiengesellschaft

Headword:
-

Relevant legal provisions:
EPC Art. 56, 123(2)

Keyword:
"Main request and auxiliary requests 2, 4, 6 and 7: inventive step (no); obvious alternative"
"Auxiliary requests 1, 3, and 5: amendments (not allowable) - added subject-matter - inadmissible generalisation of an embodiment from an example and a figure"

Decisions cited:
T 0680/93

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0138/06 - 3.3.10

D E C I S I O N
of the Technical Board of Appeal 3.3.10
of 12 March 2008

Appellant: (Patent Proprietor)
NIPPON SHOKUBAI CO., LTD.
1-1, Koraibashi 4-chome
Chuo-ku
Osaka-shi, Osaka 541-0043 (JP)

Representative:
Elend, Almut Susanne
Venner Shipley LLP
Byron House
Cambridge Business Park
Cowley Road
Cambridge CB4 0WZ (GB)

Respondent: (Opponent)
BASF Aktiengesellschaft
Patente, Marken und Lizenzen
D-67056 Ludwigshafen (DE)

Representative:

Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 18 November 2005 revoking European patent No. 1041062 pursuant to Article 102(1) EPC 1973.

Composition of the Board:

Chairman: R. Freimuth
Members: P. Gryczka
D. S. Rogers

Summary of Facts and Submissions

I. European patent 1 041 062, in respect of European patent application No. 00302130.0 was granted on the basis of a set of nine claims. Independent claim 1 read as follows:

"1. A method for refining (meth)acrylic acid from a (meth)acrylic acid-containing solution obtained by catalytic gas phase oxidation in a distillation column for separation or recovery of (meth)acrylic acid, characterized by feeding to the distillation column the (meth)acrylic acid-containing solution with the total concentration of aldehydes of 2 - 4 carbon atoms and acetone maintained at a level of not more than 2000 ppm based on the amount of (meth)acrylic acid."

II. A notice of opposition was filed in which revocation of the patent in its entirety was requested on the grounds of lack of novelty and inventive step (Article 100(a) EPC).

Inter alia, the following document was cited during the opposition proceedings:

(4) DE-A-1 95 39 295.

III. In a decision issued in writing on 18 November 2005, the Opposition Division revoked the patent.

The Opposition Division came to the conclusion that the subject-matter of claim 1 of the patent as granted was not novel, that the amendments carried out in the claims of the then pending first auxiliary request did not comply with the requirements of Article 123(2) EPC

and that the subject-matter of the then pending second auxiliary request did not involve an inventive step when considering document (4) as representing the closest prior art.

IV. The Appellant (Proprietor of the patent) lodged an appeal against the above decision. With a letter dated 11 January 2008, he filed eight sets of claims as main request (patent as granted) and auxiliary requests 1 to 7.

Claim 1 of auxiliary request 1 differs from claim 1 as granted (main request) by the replacement of the expression "from a (meth)acrylic acid-containing solution" by the expression "from a solution comprising (meth)acrylic acid and a solvent".

Claim 1 of auxiliary request 2 differs from claim 1 as granted in that it is relates only to a method for refining acrylic acid.

Claim 1 of auxiliary request 3 differs from claim 1 as granted in that it relates to a method for refining "acrylic acid from a solution comprising acrylic acid and a solvent".

Claim 1 of auxiliary requests 4 differs from claim 1 as granted in that it relates to a method for refining "(meth)acrylic acid from a methacrylic acid-containing solution or an aqueous acrylic acid-containing solution".

Claim 1 of auxiliary requests 5 differs from claim 1 as granted in that it relates to a method for refining

"acrylic acid from an aqueous acrylic acid-containing solution".

Claim 1 of auxiliary requests 6 and 7 differs from claim 1 as granted in that they relate only to a method for refining methacrylic acid.

V. According to the Appellant the claimed subject-matter was novel since the opposed prior art documents did not disclose the distillation of a methacrylic or acrylic acid containing solution obtained by catalytic gas phase oxidation with a total concentration of aldehydes of 2 to 4 carbon atoms and acetone maintained at a level of not more than 2000 ppm. Document (4) illustrated the closest prior art but disclosed only the distillation of crude meth(acrylic) acid containing almost only the acid without solvent whereas the patent-in-suit concerned the distillation of "(meth)acrylic acid-containing solutions" which were solutions containing a solvent and a minor proportion of (meth)acrylic acid dissolved therein. The technical problem to be solved by the invention with regard to this prior art was the provision of an alternative method for reducing polymerisation during the distillation of methacrylic or acrylic acid. This problem was solved by the claimed process which involved an inventive step since the prior art did not teach that a level of concentration of less than 2000 ppm of aldehydes and acetone prevented the acid-containing solution to polymerise in the course of the distillation. The replacement in claim 1 of the auxiliary requests 1 and 3 of the feature "from a (meth)acrylic acid-containing solution" by the feature "solution comprising (meth)acrylic acid and a solvent"

or "solution comprising acrylic acid and a solvent" was based on page 9, lines 16 to 18 of the application as filed. The replacement in claim 1 of the auxiliary request 5 of the feature "from a (meth)acrylic acid-containing solution" by the feature "aqueous acrylic acid containing solution" was based on page 10, lines 3 and 22 and on example 3 of the application as filed. Thus, these amendments complied with the requirements of Article 123(2) EPC.

According to the Respondent (Opponent) the claimed subject-matter lacked novelty. Document (4) represented the closest prior art and concerned, as does the patent-in-suit, the distillation of (meth)acrylic acid containing solutions, the term solution implying only that the feed to be distilled was an homogeneous liquid mixture of two or more substances as illustrated by document (19), document (19) being a definition of the term "solution" taken from the website www.ultralingua.com.

The claimed subject-matter could not involve an inventive step since it was already known from the closest prior art document itself that low molecular aldehydes and automatically also acetone should be removed before distillation since they enhanced significantly the polymerisation of acrylic or methacrylic acid. The introduction of the wording "solution comprising (meth)acrylic acid and a solvent", "solution comprising acrylic acid and a solvent" and "aqueous acrylic acid containing solution", in claim 1 of the auxiliary requests 1, 3 and 5 was not allowable with regard to the requirements of Article 123(2) EPC.

VI. The Appellant requested that the decision under appeal be set aside and that the patent be maintained as granted (main request) or, alternatively, on the basis of one of the sets of claims submitted as auxiliary requests 1 to 7 with the letter dated 11 January 2008.

VII. The Respondent requested that the appeal be dismissed.

VIII. At the end of the oral proceedings held in front of the Board on 12 March 2008, the decision of the Board was announced.

Reasons for the Decision

1. The appeal is admissible.

2. The Respondent objected to the novelty of the claimed subject-matter on the basis of documents which do not represent the closest prior art for the assessment of inventive step. In these circumstances, in view of the negative conclusions with respect to inventive step in relation with the subject-matter of claim 1 of the main request and the auxiliary requests 2, 4, 6 and 7 (see points 3 and 4 below), and since the amendments of claim 1 according to the auxiliary requests 1, 3 and 5 extend the subject-matter beyond that of the application as filed (see points 5 and 6 below), a decision of the Board on the disputed issue of novelty is not necessary.

Main request

3. *Inventive step*

3.1 The patent in suit is directed to a method for refining (meth)acrylic acid by distillation. Refining methacrylic and acrylic acid by distillation already belongs to the state of the art as illustrated by document (4) which was considered in the decision under appeal and by both parties in the appeal proceedings as representing the closest prior art for the assessment of inventive step. The Board sees no reason to depart from this finding.

Document (4) discloses a process for refining methacrylic or acrylic acid by feeding liquid mixtures resulting from catalytic gas phase oxidation reactions into a distillation column (claim 1; column 2, lines 49 to 56, column 4, lines 14 to 18). The distillation process in accordance with document (4) has the same aim as the patent in suit, that is to reduce the polymerisation ability of (meth)acrylic acid during distillation (column 4, lines 18 to 23).

According to the Appellant document (4) only disclosed the distillation of crude meth(acrylic) acid containing almost only the acid without solvent and did not relate, as does claim 1 of the patent-in-suit, to the distillation of "(meth)acryl acid-containing solutions" which were solutions containing a solvent and a minor proportion of (meth)acrylic acid dissolved therein. However, this interpretation of the term "(meth)acryl acid-containing solution" is inconsistent with the common understanding in the art of the term "solution"

which is that of an homogeneous liquid mixture of two or more substances, without any restriction with regard to the relative proportions of the components (see for example document (19), definition number "4" of the term "solution") nor to its origin. Thus, this feature does not limit the claimed subject-matter to that of distilling a "solution" directly and immediately resulting from the gas phase oxidation. Therefore, the Appellant's line of argument seeking to introduce a distinction in these respects between the claimed invention and the closest prior art must be rejected.

3.2 Having regard to this closest prior art, the Appellant submitted that the technical problem underlying the patent in suit was to provide an alternative method for reducing polymerisation during the distillation of methacrylic or acrylic acid-containing solutions.

3.3 As the solution to this problem the patent in suit proposes the method for refining (meth)acrylic acid according to claim 1, which is characterized in that the feed to the distillation column has a total concentration of aldehydes of 2 - 4 carbon atoms and acetone maintained at a level of not more than 2000 ppm based on the amount of (meth)acrylic acid.

3.4 In view of the examples in the patent in suit the Board is satisfied that this technical problem was successfully solved by the claimed method. This was not contested by the Respondent.

3.5 It remains to be decided whether or not the proposed solution to that objective technical problem, namely

the method according to claim 1, is obvious in view of the state of the art.

3.5.1 Document (4) also addresses the problem underlying the patent in suit of reducing the polymerisation of (meth)acrylic acid during distillation of liquid mixtures containing (meth)acrylic acid (column 2, lines 49 to 59 and column 4, lines 18 to 20) and proposes as a solution to reduce the amount of low molecular aldehyde impurities in the feed by a process comprising a purification by distillation (column 4, lines 3 to 23, in particular line 15). Document (4) does not explicitly disclose the reduction of acetone, however, when following the teaching of document (4) regarding reducing the content of low molecular aldehyde impurities by a process involving a distillation, acetone will necessarily also be removed for the simple reason that its boiling point (56,2 °C) is within the range of boiling points of low molecular aldehydes (acetaldehyde 20,2 °C and butyraldehyde 74,7 °C; see table of boiling points, page 4 of the letter of the Respondent dated 9 January 2008).

The threshold of not more than 2000 ppm aldehydes and acetone based on the amount of (meth)acrylic acid required by claim 1 is not mentioned in document (4). However, since document (4) teaches the removal of the aldehyde impurities responsible for the polymerisation of (meth)acrylic acid and since that threshold has not been shown to be critical, it is within the routine activity of the skilled person to decrease the amount of such impurities to any suitable level, for example to an amount of less than 2000 ppm. Thus, the threshold required by claim 1 does not result from a purposive

selection but is merely an arbitrary limit which cannot render the claimed process inventive.

3.5.2 The Board concludes from the above that document (4) gives a clear incentive on how to solve the technical problem underlying the patent in suit of providing an alternative method for reducing polymerisation during the distillation of methacrylic or acrylic acid containing solutions, namely by reducing the amount of low molecular aldehydes impurities and thus automatically also the amount of acetone in the feed to an arbitrary level e.g. 2000 ppm, thereby arriving at the solution proposed by the patent in suit. This conclusion applies to both alternatives encompassed by claim 1 namely to the method for refining methacrylic acid and also to that for refining acrylic acid, since document (4) relates to both acids.

3.6 For these reasons, the method according to claim 1 does not involve an inventive step. Therefore, the main request must be refused.

Auxiliary requests 2, 4, 6 and 7.

4. *Inventive step*

At least one of the two alternatives encompassed by claim 1 of the main request, i.e. the method for refining methacrylic acid and the method for refining acrylic acid, is also the subject-matter of claim 1 of the auxiliary requests 2, 4, 6 and 7. Consequently, the subject-matter of claim 1 of these requests lacks inventive step for the same reasons as claim 1 of the main request (see point 3 above).

Therefore, the auxiliary requests 2, 4, 6 and 7 must also be refused.

Auxiliary request 1 and 3

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

Article 123(2) EPC prohibits amendments generating "subject-matter which extends beyond the content of the application as filed ". In order to determine whether or not the subject-matter of an amended claim satisfies this requirement it has to be examined whether that amended claim comprises technical information which a skilled person would not have objectively and unambiguously derived from the application as filed (see decision T 680/93, point 2 of the reasons, not published in OJ EPO).

Claim 1 of the auxiliary requests 1 and 3 has been amended by replacing the expression "from a (meth)acrylic acid-containing solution" by the expression "from a solution comprising (meth)acrylic acid and a solvent" (auxiliary request 1) or "from a solution comprising acrylic acid and a solvent" (auxiliary request 3). The Respondent submitted that these amendments were based on page 9, lines 16 to 18 of the application as filed.

However, this part of the application as filed concerns the pre-treatment of the feed for decreasing the amount of aldehydes before feeding the solution to the claimed distillation step (page 7, lines 3 to 6, 23 to 27; page 9, lines 13 to 16: "*the refining step for feeding*

the acrylic acid-containing solution" emphasis added). Since, this passage of the application as filed does not describe the claimed distillation process but a previous step "*for feeding the acrylic acid-containing solution*", it cannot serve as a basis for the amendment of claim 1 which exclusively relates to a subsequent distillation process. The Board is not aware of any other part of the application as filed which could support this amendment.

Hence, claim 1 of auxiliary requests 1 and 3 does not fulfill the requirements of Article 123(2) EPC and, therefore, these requests must also be refused.

Auxiliary request 5

6. *Amendments*

Claim 1 of the auxiliary request 5 has been amended by replacing the expression "from a (meth)acrylic acid-containing solution" by the expression "from an aqueous acrylic acid-containing solution". The Appellant submitted that this amendment was based on page 10, lines 3 and 22 and on example 3 of the application as filed.

6.1 The passage on page 10 describes a figure relating to a particular process in which an aqueous acrylic acid-containing solution is only disclosed in combination with other features, for example a stripping step and an azeotropic distillation (page 10, lines 9 to 11) which are however not required by the amended claim 1. It can thus not be taken from this part of the application as filed that an aqueous acrylic acid-

containing solution can generally be fed to the distillation process according to claim 1 omitting all the additional specific steps of the process illustrated by the figure in the application as filed.

6.2 The example 3 refers to a particular process involving an aqueous acrylic acid-containing solution but only in combination with several other process features, such as the addition of manganese acetate and hydroquinone to the aqueous solution and specific distillation conditions (page 18, line 30; page 19, lines 1 to 29).

In the Board's judgement, the skilled person derives from this example nothing more than the bare disclosure of the specific characteristics of the exemplified process, namely the combination of a particular feed comprising an aqueous acrylic acid-containing solution but also additional components and specific distillation conditions.

Therefore, the original disclosure of this specific example cannot support the generalisation indicated in claim 1 which results in covering the distillation of an aqueous acrylic acid-containing solution, in the presence or absence of additional components and under any distillation conditions. Hence, in the context of claim 1 the feature defining that the feed is an aqueous acrylic acid-containing solution is an undue generalisation of a particular embodiment of a specific example which generates fresh subject-matter.

6.3 For these reasons, the Board concludes that amended claim 1 of the auxiliary request 5 extends the subject-matter claimed beyond the content of the application as

filed, thus contravening the provisions of Article 123(2) EPC. Therefore, this request must also be refused.

Order

For these reasons it is decided that:

The appeal is dismissed

The Registrar | The Chairman

P. Cremona | R. Freimuth