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Datasheet for the decision of 7 October 2014

Case Number: T 1606/11 - 3.3.10

Application Number: 02254650.1

Publication Number: 1275633

IPC: C07C51/09, C07C67/327, C07C51/50

Language of the proceedings: EN

Title of invention:
Method for decomposition of Michael type adduct

Patent Proprietor:
NIPPON SHOKUBAI CO., LTD.

Opponent:
THE DOW CHEMICAL COMPANY

Headword:

Relevant legal provisions:
EPC Art. 123(2), 123(3), 54(2), 111(1)

Keyword:
Amendments - allowable (yes)
Novelty - (yes)
Remittal

Decisions cited:
T 0332/87, T 0941/98, T 0190/99, T 0840/01

Catchword:

Beschwerdekammern
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Case Number: T 1606/11 - 3.3.10

D E C I S I O N
of Technical Board of Appeal 3.3.10
of 7 October 2014

Appellant: (Patent Proprietor)	NIPPON SHOKUBAI CO., LTD. 1-1, Koraibashi 4-chome Chuo-ku Osaka-shi, Osaka 541-0043 (JP)
Representative:	Jump, Timothy John Simon Venner Shipley LLP 200 Aldersgate London EC1A 4HD (GB)
Respondent: (Opponent)	THE DOW CHEMICAL COMPANY 2030 Dow Center Midland, Michigan 48674 (US)
Representative:	Boult Wade Tennant Verulam Gardens 70 Gray's Inn Road London WC1X 8BT (GB)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 2 May 2011 revoking European patent No. 1275633 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	P. Gryczka
Members:	R. Pérez Carlón
	C. Schmidt

Summary of Facts and Submissions

I. The appellant (patent proprietor) lodged an appeal against the decision of the opposition division to revoke European patent No. 1 275 633.

II. Notice of opposition had been filed by the respondent (opponent) on the grounds that the patent in suit contained added subject-matter (Article 100(c) EPC), that the invention was not disclosed in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (Article 100(b) EPC) and that the subject-matter of the claims of the patent as granted was not novel and did not involve an inventive step (Article 100(a) EPC).

III. The opposition division considered that claim 1 of the then pending second auxiliary request, which is the main request pending in these appeal proceedings, did not contain added subject-matter but lacked novelty over document D2 (WO00/53560). The decision under appeal did not refer to D2 but to D3, its equivalent in English, which does not constitute prior art for the patent in suit.

IV. The main request in these appeal proceedings has two independent claims, which read as follows:

"1. *A method for decomposing an adduct of acrylic acid and/or an acrylic ester having the formula [I]*

$$CH_2{=}CHCOO{-}(-X-COO)_n{-}R^1 \qquad [I]$$

wherein n is an integer from 1 to 5, R^1 is a hydrogen atom or an alkyl group, and X is $-CH_2CH_2-$ or $-CH(CH_3)-$, providing that X may be the same or different when n is greater than 1, or having the formula [II]

$$R^2\text{-}O\text{—}(\text{—}X\text{—}COO)_m\text{—}R^3 \qquad [II]$$

wherein m is an integer from 1 to 5, R^2 and R^3 are each, independently, a hydrogen atom or an alkyl group, and X is $-CH_2CH_2-$ or $-CH(CH_3)-$, providing that X may be the same or different when m is greater than 1, characterized in that the adduct of formula [I] or formula [II] is treated with a nitroxyl compound in an amount of 1-10% by weight based on the total quantity of the adduct in the presence of an alkali metal or alkaline earth metal salt at a temperature of 100°C to 180°C, thereby causing the adduct to decompose into acrylic acid and/or an acrylic ester and/or an alcohol."

"11. *Use of a nitroxyl compound and an alkali metal or alkaline earth metal salt for decomposing an adduct of acrylic acid and/or an acrylic ester having the formula [I]*

$$CH_2{=}CHCOO\text{—}(\text{—}X\text{—}COO)_n\text{—}R^1 \qquad [I]$$

wherein n is an integer from 1 to 5, R^1 is a hydrogen atom or an alkyl group, and X is $-CH_2CH_2-$ or $-CH(CH_3)-$, providing that X may be the same or different when n is greater than 1, or having the formula [II]

$$R^2\text{-}O\text{—}(\text{—}X\text{—}COO)_m\text{—}R^3 \qquad [II]$$

wherein m is an integer from 1 to 5, R^2 and R^3 are each, independently, a hydrogen atom or an alkyl group, and X is $-CH_2CH_2-$ or $-CH(CH_3)-$, providing that X may be the same or different when m is greater than 1, at a temperature of 100°C to 180°C into acrylic acid and/or an acrylic ester and/or an alcohol, wherein the nitroxyl compound is used in an amount of 1-10% by weight based on the total quantity of the adduct."

V. The arguments of the appellant relevant for the present decision were the following:

Claim 1 found a basis in the combination of the features of claims 5, 6 and 11, the temperatures on page 11, lines 13-18, and the relative amount of nitroxyl compound on page 7, line 28, to page 8, line 1, of the application as originally filed.

The subject-matter of claim 1 was novel over document D2 for the following reasons:

Document D2 failed to disclose a method for decomposing an adduct in the presence of 1-10% by weight of a nitroxyl compound based on the total quantity of the adduct. Example 1 of D2 was carried out by decomposing the adduct of purge (9) from the comparative example, and the weight percentage of 4-hydroxy-TEMPO based on the total quantity of the adduct in purge (9) was less than 0.57%, taking into account the mass balance of the process.

Example 1 of D2 could not be combined with the relative amount of nitroxyl compound of from 1 to 1000 ppm disclosed in the general part of the description, since in said example the amount of nitroxyl compound (less than 0.57%) was already disclosed.

The requirement that the relative amount of nitroxyl compound was of 1-10% by weight with respect to the total quantity of the adduct needed to be fulfilled at the onset of the reaction. This was not the case in example 1 of document D2. Thus, although the relative amount of 4-hydroxy-TEMPO with respect to adduct increased in example 1 of document D2 as the reaction

proceeded, the claimed method was novel over D2.

VI. The arguments of the respondent relevant for the present decision were the following:

All the features of claim 1 could be found as such in the application as originally filed, but the ranges of temperature and relative amount of nitroxyl compound introduced in amended claim 1 amounted to a double selection from two lists, with the consequence that claim 1 contained added subject-matter.

Example 1 of document D2 was representative of the general teaching of D2 and could be combined with the general disclosure in the description of said document indicating that the concentration of nitroxyl inhibitor in the bottom liquid and high boiling fraction from the column was of 1 to 1000 ppm. According to the mass balance of the system for the upper limit of 1000 ppm, purge (9) thus contained a relative amount of nitroxyl compound of 1.9%, i.e. within the amount required by claim 1, which was thus not novel.

In an alternative line of argument, the respondent argued that claim 1 failed to define the point in time at which the requirement that the relative amount of nitroxyl compound with respect to the total quantity of the adduct was 1-10% by weight should be fulfilled. Since example 1 of document D2 was carried out in a stirred tank with simultaneous distillation of the decomposition product, the relative amount of 4-hydroxy-TEMPO, which was not volatile, increased during the course of the reaction and at some point reached the required amount, such that the subject-matter of claim 1 was not novel.

VII. Oral proceedings before the board took place on 7 October 2014.

VIII. The final requests of the parties were the following:

- The appellant requested that the decision under appeal be set aside and that the case be remitted to the opposition division for further prosecution on the basis of the main request, filed with letter dated 9 September 2011, or on the basis of one of auxiliary requests 1 to 14, all filed with letter dated 20 December 2012.

- The respondent requested that the appeal be dismissed.

IX. At the end of the oral proceedings, the decision was announced.

Reasons for the Decision

1. The appeal is admissible.

Amendments, Article 123(2) EPC:

2. It has not been disputed that claim 1 of the main request formally resulted from the combination of claims 5, 6 and 11 as originally filed, the temperatures on page 11, lines 13-18, and the amount of nitroxyl compound on page 7, line 28, to page 8, line 1.

The respondent has further acknowledged that the ranges of temperature (100-180°C) and relative amount of nitroxyl compound (1-10%) in claim 1 could be obtained following generally accepted practice by combining end

points of ranges explicitly mentioned in the general description.

The respondent has, however, challenged whether the temperature range of 100-180°C had been disclosed in combination with a relative amount of nitroxyl compound of 1-10% by weight. The relative amount of nitroxyl compound resulted from combining a preferred end point and a particularly preferred end point of a range, the temperature from taking an end point of a broadest range and an end point of a particularly preferred range. By further combining these two ranges, the subject-matter of the invention was restricted to undisclosed parts of the process. In fact, the amendment amounted to a double selection from two lists, which was, in general, not allowable.

2.1 The claimed method for decomposing an adduct needs to be carried out at a certain temperature and with a certain amount of the required components. Claim 1 as originally filed did not contain this information, but the description of the application as originally filed explicitly indicates in this respect the required amount of nitroxyl compound (page 7, line 28, to page 8, line 1) and the reaction temperature (page 11, lines 13-18). The ranges of temperature and amount of nitroxyl compound in amended claim 1 are derived from these parts of the description by combining upper and lower limits according to generally accepted practice. In addition, there was no indication in the application as originally filed that the temperature and the relative amount of nitroxyl compound mentioned in those passages could not be combined, for example by technical reasons. Thus, claim 1 and, by the same token, independent claim 11 do not contain any new technical information going beyond that given in the

application as originally filed, and they therefore fulfil the requirements of Article 123(2) EPC.

2.2 The respondent further argued that the amendment in claim 1 amounted to a double selection from two lists, the first list being the required temperature, the second the amount of nitroxyl compound, which was in general not allowable.

However, for the reasons given above the board does not concur with this argument of the respondent, the two features introduced in claim 1, namely the temperature and the amount of nitroxyl compound, being disclosed in the application as originally filed as two features which the skilled person will have in any case to select, since a process has to be carried out at a given temperature and with certain amounts of reactants. Furthermore, the choice of ranges for the reaction temperature and the amount of reactant does not individualise a specific embodiment of the invention which was not disclosed in the application as originally filed.

This argument of the respondent is thus unconvincing.

3. The respondent raised no objection that the scope of the protection claimed had been extended with respect to that of the claims as granted, and the board sees no reason to raise such an objection on its own, since independent claims 1 and 11 limit the subject-matter of the corresponding claims as granted by requiring a temperature range and a relative amount of nitroxyl compound. The requirements of Article 123(3) EPC are therefore fulfilled.

Novelty, Article 54 EPC:

4. Claim 1 is directed to a method for decomposing an adduct into acrylic acid and/or acrylic ester and/or an alcohol by treating an adduct of formula [I] or [II] with 1-10% by weight based on the total quantity of the adduct of a nitroxyl compound, in the presence of an alkali metal or alkaline earth metal salt, at a temperature of 100°C to 180°C.

4.1 Example 1 of document D2 discloses reacting 800 g of quench liquid 1, obtained as purge (9) according to the comparative example, in a stirred reactor, at 180°C and in the presence of sodium carbonate.

The sole point of dispute among the parties was whether document D2 describes a method carried out with an amount of nitroxyl compound of "1-10% by weight based on the total quantity of the adduct", all other features of the claimed process being disclosed in example 1 of D2.

4.2 The board notes that the comparative example of D2 discloses feeding 18 g/h of a 0.5% aqueous solution of 4-hydroxy-TEMPO, which amounts to 0.09 g/h of this compound, into distillation column (3). Considering the mass balance of distillation column (3), assuming that all 4-hydroxy-TEMPO leaves column (3) at (7), that no decomposition takes place, which is the most favourable situation for the appellant, and using the data provided by the appellant and not challenged by the respondent during the oral proceedings before the board that the relative amount of purge (9) which is of the general formula [I] or [II] lies between 92.1% and 39.6%, the concentration of 4-hydroxy-TEMPO in purge

(9) lies between 0.24% and 0.57% by weight, as obtained by the following inequality:

$$\frac{0.09\ g/h}{92.1\%\ 40\ g/h} \leq [TEMPO] \leq \frac{0.09\ g/h}{39.6\%\ 40\ g/h}$$

$$0.24\% \leq [TEMPO] \leq 0.57\%$$

This relative amount is below 1%, which is the lowest relative amount required by claim 1.

4.3 The respondent has provided two lines of argument seeking to show that the relative amount of nitroxyl compound required by claim 1 was nevertheless disclosed in document D2 in combination with the features of example 1.

4.3.1 The respondent relied on the conclusions reached in decision T 332/87 (not published in OJ EPO) and argued that since example 1 of D2 was representative of the general teaching of that document it could be combined with a further passage in the description, namely that on page 6, lines 28-29, disclosing that the bottom liquid and high boiler fraction removed from the column, which is line (7) in figure 1, contained from 1 to 1000 ppm of nitroxyl inhibitor. Since the inhibitors present in the quench liquid 1 do not vaporise (D2, page 7, lines 39-40), they could not leave cooler (2) with the gaseous feed (10) and thus, according to the mass balance of the system, all the nitroxyl inhibitor left cooler (2) through line (9).

Taking the upper value of 1000 ppm of inhibitor disclosed there and assuming that none of the inhibitor decomposes, that all the inhibitor present in line (7) (a concentration of 1000 ppm of inhibitor in 750 g/h of

bottoms amounts to 0.75 g/h of inhibitor alone) exited cooler (2) through line (9) and that the remainder of the purge (40 g/h) consisted of compounds of the general formula [I] or [II] (it is however noted that according to the appellant the concentration of these compounds in said feed lay between 39.6% and 92.1%, see point 4.2), the respondent concluded that purge (9) contained 1.9% by weight of 4-hydroxy-TEMPO as required by claim 1.

Although it is generally accepted that the teaching of a prior-art document is not confined to the information provided in its examples but includes the disclosure of that document as a whole, when it comes to deciding what can be directly and unambiguously derived from a document, its different passages may be combined only if the skilled person would see a good reason for combining them (T 941/98, not published in OJ EPO, Reasons 5.1; T 840/01, not published in OJ EPO, Reasons 2).

The question thus arises whether the general teaching on page 6, lines 26-30, of D2 can be combined with the comparative example and example 1 thereof.

4.3.2 The starting material of example 1 of D2 is the quench liquid 1 of purge (9) of the comparative example. Said comparative example is self-containing and gives a complete, detailed disclosure of the composition of the feeds, the apparatuses used and the operating conditions of the latter. Specifically, it discloses introducing to the 75th tray of the separation column (3) 18 g/h of a 0.5% aqueous feed of 4-hydroxy-TEMPO (page 19, lines 3-6).

Hence the skilled reader would not seek any missing

information in the general description with respect to the amount of 4-hydroxy-TEMPO present in purged quench liquid 1, since this information is already provided in the comparative example as a consequence of the amount of 4-hydroxy-TEMPO fed and the operating conditions of the process.

For this reason, the board concludes that the skilled reader would not combine the comparative example of D1 and the general disclosure in the description of the amount of nitroxyl compound in the bottom liquid and high boiling fraction. This argument of the respondent is thus unconvincing.

4.4 In a different line of argument, the respondent argued that the requirement of claim 1 for the amount of nitroxyl compound to be 1-10% by weight based on the total quantity of the adduct could be met at any point in time. Example 1 of D2 was carried out in a stirred reactor from which the reaction product was continuously distilled off. According to D2, 4-hydroxy-TEMPO did not vaporise (page 7, lines 39-40) and would therefore accumulate in the reactor tank as the reaction proceeded. Assuming that the amount of 4-hydroxy-TEMPO in quench liquid 1 from purge (9) was between 0.24% and 0.57% by weight (see point 4.3.2 above), and considering that example 1 of D2 disclosed a conversion of 90% of the adduct, the concentration of 4-hydroxy-TEMPO in the stirred tank at the end of the reaction was of from 2.4% to 5.7% and hence within the limits set in claim 1.

4.4.1 When considering a claim, the skilled person should rule out interpretations which are illogical or do not make technical sense. He should try, with synthetical propensity, i.e. building up rather than tearing down,

to arrive at an interpretation of the claim which is technically sensible and takes into account the whole disclosure of the patent. The patent must be construed by a mind willing to understand, not a mind desirous of misunderstanding (T 190/99, not published OJ EPO, Reasons 2.4, Case Law of the Boards of Appeal, 7th Edition 2013, II.A.6.1).

In a chemical process, the relative amount of components is normally understood, in the absence of any indication that it should be otherwise, as the amount at the onset of the reaction or as the amount introduced into a reactor, i.e. at the moment at which such amount can be easily quantified. These relative amounts vary in the course of the reaction, since at least part of the reagents will be consumed, whereas other components such as catalysts or stabilisers are often not consumed at the same rate, if at all.

The respondent acknowledged that the patent in suit does not explicitly indicate that it should be interpreted otherwise.

Although claim 1 does not explicitly indicate that the relative amount of nitroxyl compound refers to the quantity of adduct at the beginning of the reaction, it states that it refers to the *total* quantity of adduct, hinting that it should be interpreted in the usual way.

The example and the comparative examples of the patent in suit refer to the amounts of nitroxyl compound and Michael adduct [I] or [II] introduced into the reactor, so that the interpretation that the relative amount of nitroxyl compound refers to that introduced into the reactor is also in line with the whole disclosure of the patent in suit.

The board thus concludes that the relative amount of 1-10% by weight based on the total quantity of the adduct refers in the present case to the relative amount at the onset of the reaction. Since in example 1 of D2 such an amount lies between 0.24% and 0.57% (see point 4.2 above), it is further concluded that example 1 of document D2 fails to disclose the amount of nitroxyl compound required by claim 1.

5. The board thus concludes that the method of claim 1 and, by the same token, the use of claim 11 of the main request are novel over D2.

Remittal:

6. The decision under appeal had not dealt with all the grounds for opposition, and the board considers it appropriate to grant the request of both parties to remit the case to the opposition division on the basis of the claims according to the main request for further prosecution (Article 111(1) EPC).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the opposition division for further prosecution on the basis of the main request, filed with letter dated 9 September 2011.

The Registrar: The Chairman:

C. Rodríguez Rodríguez P. Gryczka

Decision electronically authenticated