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Datasheet for the decision of 10 February 2015

Case Number: T 0297/11 - 3.3.10

Application Number: 06001684.7

Publication Number: 1690850

IPC: C07C201/08, C07C205/06

Language of the proceedings: EN

Title of invention:
Process for the production of dinitrotoluene

Patent Proprietor:
Bayer MaterialScience AG
Bayer MaterialScience LLC

Opponent:
Josef Meissner GmbH & Co

Headword:
Process for the production of dinitrotoluene/ BAYER

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
Novelty - (yes)
Inventive step - (no)

Decisions cited:
T 1523/07

Catchword:

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Case Number: T 0297/11 - 3.3.10

D E C I S I O N
of Technical Board of Appeal 3.3.10
of 10 February 2015

Appellant: (Opponent)	Josef Meissner GmbH & Co Bayenthalgürtel 16-20 D-50968 Köln (DE)
Representative:	Von Rohr Patentanwälte Partnerschaft mbB Rüttenscheider Straße 62 45130 Essen (DE)
Respondent: (Patent Proprietor 1)	Bayer MaterialScience AG 51368 Leverkusen (DE)
Respondent: (Patent Proprietor 2)	Bayer MaterialScience LLC 100 Bayer Road Pittsburgh, PA 15205 (US)
Representative:	BIP Patents c/o Bayer Intellectual Property GmbH Creative Campus Monheim Alfred-Nobel-Straße 10 40789 Monheim (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 6 December 2010 rejecting the opposition filed against European patent No. 1690850 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	P. Gryczka
Members:	J.-C. Schmid
	F. Blumer

Summary of Facts and Submissions

I. The Appellant (Opponent) lodged an appeal against the decision of the Opposition Division rejecting the opposition against European patent No. 1 690 850, independent claim 1 thereof reading as follows:

"1. A process for the isothermal nitration of aromatic organic compounds, comprising

(A) contacting (1) an aromatic organic compound, with (2) a mixture of (a) sulfuric acid and (b) nitric acid, via a mixing nozzle which comprises a cylindrical tubular reactor and an annular gap surrounding the cylindrical tubular reactor, in which (1) said aromatic organic compound flows through the tubular reactor, and (2) said mixture of (a) sulfuric acid and (b) nitric acid flows through the annular gap, and (1) and (2) are mixed together upon emerging from the tubular reactor and the annular gap, wherein the ratio of the average rates of flow of (1) aromatic organic compound in the tubular reactor and of (2) the mixture of (a) sulfuric acid and (b) nitric acid in the annular gap ranges from 0.5:1 to 10:1;
and
(B) reacting the mixture of (1) said aromatic organic compound, and (2) said mixture of (a) sulfuric acid and (b) nitric acid, thereby forming nitrated aromatic organic compounds."

II. The Appellant requested in its notice of opposition the revocation of the patent in suit in its entirety on the grounds of lack of novelty and inventive step (Article 100(a) EPC), insufficient disclosure of the invention (Article 100(b) EPC) and extension of the subject-matter of the patent in suit extended beyond the

content of the application as filed (Article 100(c) EPC).

Inter alia the following documents were submitted in the opposition proceedings:

(1a) US-A-5 763 697 and

(3) EP-A-0 373 966.

III. In the contested decision, the subject-matter of the claims as granted was held to be novel over document (1a), since the flows of the aromatic compound and the mixed acid in the mixing nozzle device of the process disclosed therein were inverted in comparison to those of the process of claim 1. The possibility of inverting the feeds was mentioned in document (1a), but only in the background prior art discussion with reference to document (3), which did not disclose a coaxial feeding of the reactants. Accordingly, the inversion of the product flows was not disclosed in document (1) for a mixing device with a coaxial feeding according to step (A) of the process of claim 1. Starting from document (1a) as the closest prior art, the technical problem underlying the patent-in-suit was to provide an alternative nitration process. In the background art discussion of document (1a), it was disclosed that either the aromatic compound is fed into the mixed acid or the mixed acid is fed into the aromatic compound. However, the dispersion of the aromatic compound into the mixed acid at the beginning of the nitration increased dramatically the build-up of by-products. Thus, document (1) taught away from this unfavourable alternative. In order to solve the technical problem underlying the invention, the skilled person had to make a choice between two possibilities of introducing

the mixture of acids and the aromatic compound in the mixing device. The claimed solution was not obvious since the exothermic nitration reaction involved mixing two immiscible phases, which in view of the cited document was not trivial. In particular, according to document (3), the densities and viscosities of the feeds as well as the concentration of the acid mixture required adjustments in order to obtain a safe and controlled nitration. The Opposition Division came thus to the conclusion that the proposed solution involved an inventive step.

IV. According to the Appellant the embodiment wherein the jet of the aromatic organic compound surrounds the central acid jet was disclosed in document (1a) as being the best method to mix the two reactants. Hence, the other possibility, i.e. where the reactant jets are inverted, was implicitly disclosed in this document. Furthermore, the fact that document (1a) disclosed that the acid jet can be used as central driving jet suggested that it also can be used as the surrounding jet. That resulted in an implicit disclosure of the claimed process in document (1a). The subject-matter of claim 1 therefore lacked novelty and/or inventive step with respect to document (1a).

V. According to the Respondent, document (1a) disclosed a process for the nitration of aromatic compounds wherein the acid jet always surrounded the central jet of the aromatic compounds. Consequently, there was no implicit disclosure of the claimed process in that document. The passage concerning the feature that the acid jet can be used as the central driving jet referred to the possibility of recycling the acid in the process. The subject-matter of claim 1 was therefore novel over document (1a).

The closest prior art was document (1a). The technical problem underlying the patent-in-suit was to provide a further process for the nitration of aromatic compounds.

The solution proposed by the patent-in-suit was characterised in that the aromatic organic compound flows through a tubular reactor and the mixture of the acids flows through the annular gap surrounding the tubular reactor. According to document (1a) the acid jet had to surround the central jet of the organic phase. Furthermore, document (1a) taught that standard mixing techniques, such as the mixing in a stirred tank reactor or the injection of the material to be nitrated into a turbulent jet of acid were considered insufficient for achieving the required high dispersion of the material to be nitrated in the acid mixture, particularly for large-scale industrial plants in which large quantity of reactant streams have to be mixed rapidly. Document (1a) also made clear that the dispersion of the acid mixture in the product to be nitrated in a mixing device, as described in document (3), did not offer any improvement. The subject-matter of claim 1 involved therefore an inventive step with respect to document (1a) alone or in combination with document (3).

VI. The Appellant requested that the decision under appeal be set aside and that the patent be revoked.

The Respondent requested that the appeal be dismissed.

VII. At the end of the oral proceedings held on 10 February 2015 the decision of the Board was announced.

Reasons for the Decision

1. The appeal is admissible.

2. Sufficiency of disclosure

The Appellant submitted that the invention was insufficiently disclosed. In view of the negative conclusions in respect of the claimed invention for lack of inventive step, as set out in point 4 below, a decision of the Board on this issue is not necessary.

3. Novelty with regard to document (1a)

The Appellant challenged the novelty of the claimed process *inter alia* with regard to documents (1a).

Document (1a) relates to a continuous process for the nitration of mononuclear aromatic compounds with a mixture of nitric acid and sulphuric acid. The aromatic compound to be nitrated is conveyed in a mixing nozzle to a central driving jet of the acids mixture in such a way that it surrounds the acids jet (see claim 1; figure 1). The mixing device applies for the isothermal nitration (see column 5, line 19 to 31). The ratio of flow velocities V1/V2 (acid phase / organic phase) of both phases to be mixed is 1 and greater than 1.

In contrast to the process disclosed in document (1a), the process according to claim 1 of the patent-in-suit requires that the acid jet surrounds the central jet of the aromatic organic compound.

The Appellant conceded that this feature was not explicitly disclosed in document (1a), but submitted that it was implicitly disclosed therein. The

embodiment wherein the jet of the aromatic organic compound surrounds the central acid jet was disclosed in document (1a) as being the best method to mix the two reactants (column 4, lines 3 to 9). Hence, according t the Appellant, the other method, i.e. where the reactant jets are inverted, was implicitly disclosed in document (1a). Furthermore, the fact that document (1a) disclosed that the acid jet can be used as the central driving jet (column 5, lines 31 and 32) meant that it can also be used as the surrounding jet. That resulted in an implicit disclosure of the inverted way of mixing the two phases according to claim 1.

The Board observes that it is a generally applied principle that for concluding lack of novelty, there must be a direct and unambiguous disclosure in the state of the art which would inevitably lead the skilled person to subject-matter falling within the scope of what is claimed. In this context an "implicit disclosure" on which the novelty attack of the Appellant is based means no more than a clear and unambiguous consequence of what is explicitly disclosed (see T 1523/07, not published in OJ EPO).

In the present case document (1a) discloses that the jet of the aromatic organic compound surrounds the central acid jet. It thus does not implicitly disclose that the acid jet surrounds the central jet of the organic phase, since such an inversion of the two flows is not a direct consequence of the way the flows are handled in document (1a).

The Board concludes therefore that the subject-matter of the claim 1 of the patent-in-suit is novel over the disclosure of document (1a).

4. Inventive step

The Board considers, in agreement with the parties and the opposition division, that the closest prior art is represented by document (1a).

Starting from document (1a) as the closest prior art, the respondent submitted that the technical problem to be solved by the patent-in-suit was the provision of a further process for the nitration of aromatic compounds.

The proposed solution to this problem is the process of claim 1 which is characterised in that the aromatic organic compound flows through a tubular reactor and the mixture of the acids flows through the annular gap surrounding the tubular reactor.

It has now to be decided if the proposed solution is obvious in the light of the prior art, in other words if it was obvious for the skilled person to invert the jets of the reactant in the mixing nozzle in order to provide a further process for the nitration of aromatic compounds.

In order to react a mixture of an aromatic organic compound with a mixture of sulfuric acid and nitric acid to form nitrated aromatic organic compounds, the skilled person knows that the two reactants have to be mixed. This has been done in document (1a) using a coaxial mixing nozzle, in which the aromatic organic flow surrounds the central acid flow. The skilled person would have expected that by inverting the flows of the two reactants in the mixing nozzle describing in document (1a), the two reactants will also be mixed. In the absence of any unexpected technical effect linked

to this inversion of the reactant flows in the mixing nozzle, this alternative must be regarded as an arbitrary one, which cannot per se constitute the basis for acknowledging an inventive step, even if there is no direct pointer or suggestion in document (1a) towards this modification.

According to the Respondent, document (1a) taught away from the proposed solution, because according to document (1a) the inverse mixing of acid in the organic phase consisting in utilising an injector in which the nitrating acid was the central driving jet and the axially inflowing aromatic compound surrounded this central jet was compulsory.

Document (1a) is specifically concerned with the mono nitration of aromatic compounds. Therefore, document (1) specifically focused on this inverse mixing of acid in the organic phase, because that permitted to avoid the further nitration of the formed mono-nitro compound (see column 3, lines 61 to 65; column 5 lines 5 to 18). The claimed process however is broadly directed to the nitration of aromatic compounds, also including the di-nitration. In the claimed process the di-nitrated aromatic compounds are not unwanted by-products because there is no need to stop at the mono-nitration stage, as opposed to the process of document (1a). Moreover, the Respondent provided no data, e.g. in the form of comparative examples, showing an unexpected affect, e.g. less than expected by-products formation. Accordingly, the skilled person faced with the problem of merely providing a further process for nitration of aromatic compounds would not be discouraged from using a different way of mixing the acid phase with the organic phase in order to carry out a process for the nitration of organic aromatic compounds. The Board

therefore cannot agree with the Respondent's argument that the skilled person would be discouraged from inverting the jets of the reactant in the mixing nozzle in the process of document (1) in order to provide a further process for the nitration of organic aromatic compounds. Accordingly, this argument must be rejected.

Hence, the subject-matter of claim 1 represents an obvious solution to the problem underlying the patent-in-suit. Consequently, the subject-matter of claim 1 of the patent-in-suit as granted does not involve an inventive step (Article 56 EPC).

5. Under these circumstances, it is not necessary to take a decision on other novelty and inventive step objections raised by the Appellant.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

C. Rodríguez Rodríguez P. Gryczka

Decision electronically authenticated