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Datasheet for the decision of 17 July 2025

Case Number: T 0005/23 - 3.3.10

Application Number: 06771056.6

Publication Number: 1890998

IPC: C07C263/10, C07C263/20, C07C265/14, C08G18/76

Language of the proceedings: EN

Title of invention:
PROCESS FOR THE PREPARATION OF POLYISOCYANATES OF THE DIPHENYLMETHANE SERIES

Patent Proprietor:
HUNTSMAN INTERNATIONAL LLC

Opponent:
BASF SE

Headword:

Relevant legal provisions:
EPC Art. 54(2), 56

Keyword:
Novelty - (no) - main request
Auxiliary request 1 - allowable

Decisions cited:

Catchword:

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Beschwerdekammern

Boards of Appeal

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Case Number: T 0005/23 - 3.3.10

D E C I S I O N
of Technical Board of Appeal 3.3.10
of 17 July 2025

Appellant: (Opponent)	BASF SE Carl-Bosch-Strasse 38 67056 Ludwigshafen (DE)
Representative:	Altmann, Andreas Altmann Stößel Dick Patentanwälte PartG mbB Isartorplatz 1 80331 München (DE)
Respondent: (Patent Proprietor)	HUNTSMAN INTERNATIONAL LLC 500 Huntsman Way Salt Lake City, Utah 84108 (US)
Representative:	Hoffmann Eitle Patent- und Rechtsanwälte PartmbB Arabellastraße 30 81925 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 6 October 2022 rejecting the opposition filed against European patent No. 1890998 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chair	P. Gryczka
Members:	R. Pérez Carlón
	L. Basterreix

Summary of Facts and Submissions

I. The appellant (opponent) lodged an appeal against the opposition division's decision rejecting the opposition against European patent No. 1 890 998.

II. Notice of opposition had been filed on all the grounds contained in Article 100 EPC.

III. In the first decision on the present case, namely the decision T 89/17, the board concluded that the claimed invention was sufficiently disclosed for it to have been carried out by a skilled person. It was uncontested that the claimed subject-matter had a basis in the application as originally filed. The file was remitted to the opposition division for further examination on the basis of the patent as granted.

The current appeal concerns the subsequent decision of the opposition division on the case.

IV. The following pieces of evidence are relevant to the present decision:

D1 US 6,576,788 B1
D2 DE 102 45 584 A1
D4 WO 2004/056756 A1
D12 Reproduction of the process of Example 1 of D1

V. Claim 1 of the patent as granted, which is the main request of the respondent (patent proprietor) in appeal, reads as follows:

"A process for preparing mixtures comprising diphenylmethane diisocyanates and polyphenylpoly

methylene polyisocyanates comprising the step of reacting the corresponding mixtures of diphenybnethane diamines and polyphenylpolymethylenepolyamines with phosgene in the presence of at least one solvent in stages whereby in a first stage the corresponding carbamoyl chlorides and amine hydrochlorides are formed and whereby in a subsequent stage residual carbamoyl chlorides are dissociated into the corresponding polyisocyanates and hydrogen chloride and amine hydrochlorides are phosgenated to form ultimately the corresponding polyisocyanates characterised in that a controlled amount of amine hydrochloride solids remain unreacted at the point where residual excess phosgene is removed from the reaction mixture, wherein the r esidual content of amine hydrochloride solids at the point where residual excess phosgene is removed from the reaction mixture is between 10 and 5000 ppm, and wherein said solid carbamoyl chlorides and/or solid ureas are not present at the point where residual excess phosgene is removed from the reaction mixture."

VI. The opposition division concluded in the contested decision that the claimed process was novel over those described in D1 to D4. Document D1 was the closest prior art. The claimed process differed from that described in D1 in the proportion of solid amine hydrochloride of between 10 and 5000 ppm at the point where residual excess was removed. The problem underlying the claimed invention was to provide an alternative production process for PMDI with an acceptable colour. The claimed solution, characterised by the residual amount of amine stipulated by claim 1, would not have been obvious to a skilled person and was thus inventive.

VII. Claim 1 of auxiliary request 1, filed with the reply to the grounds of appeal, stipulates a residual content of amine of between 1500 and 2500 ppm.

VIII. The appellant's arguments were as follows.

The example of D1 explicitly disclosed all the features of claim 1 with the exception of the proportion of amine hydrochloride solids. This feature was, nevertheless, implicitly disclosed as an inevitable result of the features of that example, as shown by experimental evidence D12. Documents D2 and D4 also disclosed all the features of claim 1.

If the claimed process were to be considered novel, document D1 would be the closest prior art and the sole distinguishing feature would be the proportion of amine hydrochloride. The available evidence could not prove a reduction in colour compared to the prior art, meaning that the sole problem solved was that of providing an alternative process. The claimed solution was thus obvious in view of D1 alone.

The first auxiliary request should not be admitted into the proceedings. It was unclear, lacked disclosure and was not novel over D1, D2 and D4. As there was no data which could allow a direct comparison with the process of D1, the problem solved was that of providing an alternative. The subject-matter of this request would have been obvious to a skilled person and was thus not inventive.

IX. The respondent's arguments were as follows.

Experimental evidence D12 did not reproduce the process disclosed in the example of D1. Neither D1 nor D2 nor

D4 disclosed the proportion of amine hydrochloride solids in claim 1 and the claimed process was novel.

D1 was the closest prior art. The problem underlying the claimed invention was to provide a process with improved lightness of colour, or, if reformulation was required, with a comparable colour and reduced complexity. The claimed solution was characterised by the residual content of amine hydrochloride solids in claim 1 and the problem was credibly solved in view of the table in paragraph [0051] of the description. The claimed solution was not taught, even as an alternative, by the prior art and was thus inventive.

The process in claim 1 of auxiliary request 1 defined a residual content of amine hydrochloride solids close to that exemplified in the patent, which showed that the problem of providing an alternative process for lightening the colour of the product was solved. The claimed solution, characterised by this specified residual content of amine hydrochloride solids was not taught by the prior art and was thus inventive.

X. Oral proceedings before the board of appeal took place on 17 July 2025.

XI. The parties' final requests were as follows:

The appellant requested that the appealed decision be set aside and the patent revoked.

The respondent requested that the appeal be dismissed or that the patent be maintained with the claims filed as auxiliary requests 1 to 12 with the reply to the statement of grounds of appeal.

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

Reasons for the Decision

1. The appeal is admissible.

2. Novelty

2.1 D1

2.1.1 Novelty over D1 hinges on whether example 1 of D1 discloses a process having the required proportion of amine hydrochloride solids at the point where residual excess phosgene is removed.

The appellant relied in this respect on the experimental evidence filed as D12, which - according to the appellant - showed said proportion to be 1542 ppm.

The board, however, concludes that D12 does not reproduce the experimental conditions of example 1 of D1, at least in view of the difference in the second reaction stage. In D1, this stage requires a valve tray column having six theoretical plates in the stripper section and two plates in the enrichment section (see D1, column 8, lines 14 and 15). In D12, in contrast, four vessels disposed in series, each of them simulating a tray (theoretical plate), were used. In the absence of a reproduction of the conditions of example 1 of D1, it cannot be concluded that the process in that example inevitably led to a proportion of amine hydrochloride like that in claim 1.

The claimed process is thus novel over that in D1.

2.1.2 The appellant argued that, due to the lapse of time between the filing of D1 - which is a patent of the appellant - and experimental evidence D12, the process in the former document could not be exactly reproduced and some approximations were necessary.

However, it was incumbent on the appellant to provide convincing explanations as to why the results in D12 were relevant despite the different experimental conditions. Merely arguing that the set-up used in D1 was no longer available does not make every possible alternative a suitable equivalent.

2.2 D2 and D4

At the oral proceedings before the board the appellant referred to its written submissions in respect to novelty over D2 and D4. The board sees no reason to depart from its preliminary view, in the communication in preparation for oral proceedings, that neither of these documents disclose all the features of claim 1.

The appellant submitted calculations which should show that D2 disclosed the proportion of amine hydrochloride in claim 1. The appellant used, for calculation purposes, the amount of solvent in D1 and that in the patent. Document D2, however, relates to a different set-up and there is no reason to assume that the dilution required is the same as in D1 and the patent. D2 only discloses the proportion of amine hydrochloride relative to the isocyanate (see paragraph [0021]), and the broad range of solvent proportions of 50 to 500% referred to the starting amine (see last sentence in paragraph [0018]). In the absence of a precise

proportion of solvent being indicated, that of amine hydrochloride cannot be precisely determined.

Document D4 could arguably disclose amine hydrochloride, but it is silent on its proportion. Thus, D4 does not disclose all the features of claim 1 for this reason alone.

2.3 The board thus concludes that the claimed process is novel (Article 54(2) EPC).

3. Inventive step

3.1 It was undisputed that document D1 was the closest prior art. It was also undisputed that, if claim 1 were held to be novel over the process in example 1 of D1, this would be by virtue of the proportion of amine hydrochloride in claim 1.

3.2 Problem underlying the claimed invention

The respondent defined the problem underlying the claimed invention as the provision of a process for preparing a mixture comprising diphenylmethane diisocyanates (MDI) and polyphenylpolymethylene polyisocyanates (PMDI) with improved lightness of colour.

If an improvement in the lightness of colour compared to that in the prior art could not be acknowledged, the problem could still be defined as providing an alternative process for producing MDI/PMDI mixtures having a comparable colour with reduced complexity (see letter dated 3 February 2025, second full paragraph on page 5).

3.3 Solution

The claimed solution to these problems is the process in claim 1, characterised by a residual content of amine hydrochloride solids between 10 and 5000 ppm at the point where residual excess phosgene is removed from the reaction mixture.

3.4 Success of the claimed solution

The respondent relied on the table in paragraph [0051] of the patent to show that the problems defined above have been credibly solved by the claimed process.

This table has four entries and amine hydrochloride solid proportions range from 1823 to 2186 ppm. The colour improves throughout the series, i.e. the higher the solid amine hydrochloride proportion, the lighter the colour.

The respondent argued that, in view of the correlation between the proportion in claim 1 and the colour, an effect would be achieved for every proportion in claim 1 of the patent as granted. Even if at low concentrations the effect were smaller, it would nevertheless still be present.

The board does not agree. The patent only provides evidence of a narrow range of proportions, differing at the most by 20%, whilst claim 1 includes two and a half orders of magnitude. It is possible that the effect could be obtained at very low concentrations, but it is also possible that the data provided could not be extrapolated and that any effect could only be achieved at certain concentrations. In the absence of experimental information, no conclusions can be drawn.

The board thus concludes that neither of the problems formulated by the respondent in point 3.2 above has been solved by every embodiment of claim 1.

The respondent further argued that the core idea of the invention was to remove phosgene before phosgenation was complete. By keeping the proportion of amine hydrochloride solids as set in claim 1, all the residual amine solid was converted at the same time that phosgene was removed. In this manner, phosgene could not react with other by-products to form coloured compounds (see paragraph [0010] of the patent) as the reaction with amine was more favourable.

This may be a plausible explanation for the reasoning behind the effect, but other possible explanations may also exist. Mechanisms are only hypotheses supported by experimental data - in the present case for only a limited part of the claimed subject-matter. This argument is thus not convincing.

3.5 Reformulation of the technical problem

In view of the preceding point, the problem underlying the claimed invention needs to be reformulated in a less ambitious manner as the provision of an alternative process for preparing a mixture of MDI and PMDI. It was undisputed that the process in claim 1 credibly solves this problem.

3.6 It remains to be examined whether the claimed solution would have been obvious to a skilled person in view of the prior art.

Even though document D1 does not explicitly disclose

the amount of amine hydrochloride, it is known that this compound is formed in the process (see, for example, paragraph [0011] of D2, which merely corroborates the chemistry involved in the process as disclosed in paragraphs [0009] and [0010] of the patent). When seeking an alternative, a skilled person would have considered a process leading to very small amounts of by-products, including solid amine hydrochloride. Amine hydrochloride is in fact the hydrochloride of the starting material, and the less of this compound that remains, the better.

The respondent argued that D1 did not teach the claimed solution and that it was specifically aimed at lighter-coloured products without needing additives. However, since the problem is the mere provision of an alternative, the claimed solution would have been obvious due to the presence of those compounds in the reaction mixture being known from the prior art.

3.7 The board thus concludes that the ground for opposition in Article 100(a) EPC precludes the maintenance of the patent as granted.

4. Auxiliary request 1

4.1 Claim 1 of auxiliary request 1 requires the residual content of amine hydrochloride solids at the point where residual excess phosgene is removed from the reaction mixture to be between 1500 and 2500 ppm.

4.2 The appellant requested that this request not be admitted into the proceedings. However, auxiliary request 1 was received on 21 March 2017, subsequently renumbered as the second auxiliary request and was part of the decision appealed in T 89/17 (see point 15.3.2).

It was also filed again with the reply to the grounds of appeal. The board thus sees no reason not to admit this request into the current appeal proceedings.

4.3 The appellant also argued that claim 1 of the first auxiliary request was not clear. However, claim 1 results from the combination of granted claims 1 and 2 and thus it is not open to examination with respect to clarity (see G 3/14, OJ 2015, 102, catchword).

4.4 The appellant also argued that the claimed invention was not sufficiently disclosed. However, that matter was settled in T 89/17 and no change in the circumstances of the case is apparent. The conclusion in T 89/17 is thus binding on the present board.

4.5 The conclusion on novelty provided for claim 1 of the main request applies in the same manner to the process in claim 1 of the first auxiliary request.

4.6 Inventive step

Claim 1 specifies solid amine hydrochloride proportions between 1500 and 2500 ppm whilst the available evidence spans from 1823 to 2186 ppm, i.e. the available evidence in paragraph [0051] of the patent falls squarely within the range specified in claim 1.

The data shows a relationship between the lightness in colour of the product and the proportion of solid amine hydrochloride in the range in claim 1. The problem formulated by the respondent of providing an alternative process to lighten the colour of PMDI in admixture with MMDI (see passage bridging pages 12 and 13 of the letter dated 22 February 2024) is thus considered solved by the process of claim 1.

The appellant argued that the evidence provided did not compare the claimed subject-matter with that of D1 and that, for this reason alone, it could not be concluded that the claimed invention provided an improvement, in terms of lightness of colour of the final product, compared to the prior art.

However, the claimed invention shows the existence of a relationship between lightness in colour and amine chlorhydrate solids not taught by the prior art and which is the technical contribution of the claimed invention. D1 is silent on the amount of this component in the reaction media and thus it cannot be requested that the respondent provide a comparison with something not available from the prior art.

The appellant relied on D12 to show that the proportion of amine chlorhydrate solids in D1 was not zero, as argued by the patentee, but a value as in claim 1. However, the differences pointed out in the context of novelty of the main request are also relevant in this context. D12 does not provide an exact repetition of example 1 of D1 and the solid content in this example is not known. This argument is thus not convincing.

The appellant further argued that the degree of colour was not a feature of claim 1 and thus no effect could have been considered shown. However, this is precisely the effect sought by the patent and does not need to be a feature of claim 1.

4.7 The board concludes that the process in claim 1 of auxiliary request 1 is inventive (Article 56 EPC) and this request is thus allowable.

Order

For these reasons it is decided that:

The decision under appeal is set aside.

The case is remitted to the opposition division with the order to maintain the patent with the claims of auxiliary request 1 filed with the reply to the statement of grounds of appeal, and a description and a drawing to be adapted if necessary.

The Registrar: The Chair:

A. Chavinier P. Gryczka

Decision electronically authenticated