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Datasheet for the decision of 31 January 2018

Case Number: T 0149/14 - 3.3.10

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Title of invention:
Process for the production of the toluene diisocyanate

Patent Proprietor:
Covestro Deutschland AG

Opponent:
Ström & Gulliksson AB

Headword:
Process for the production of the toluene diisocyanate/ Covestro

Relevant legal provisions:
EPC Art. 56, 111(1), 123(3)
RPBA Art. 12

Keyword:
Main request- Amendments - broadening of claim (yes)
Remittal to the department of first instance (no)
Inventive step - auxiliary request (no)

Decisions cited:
T 0022/81, T 0270/90

Catchword:

Europäisches Patentamt
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Beschwerdekammern

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Case Number: T 0149/14 - 3.3.10

D E C I S I O N
of Technical Board of Appeal 3.3.10
of 31 January 2018

Appellant: (Opponent)	Ström & Gulliksson AB Box 4188 203 13 Malmö (SE)
Representative:	Ström & Gulliksson AB P.O. Box 4188 203 13 Malmö (SE)
Respondent: (Patent Proprietor)	Covestro Deutschland AG Kaiser-Wilhelm-Allee 60 51373 Leverkusen (DE)
Representative:	Levpat c/o Covestro AG Gebäude 4825 51365 Leverkusen (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 25 November 2013 concerning maintenance of the European Patent No. 1864969 in amended form.**

Composition of the Board:

Chairman	P. Gryczka
Members:	J.-C. Schmid
	C. Schmidt

Summary of Facts and Submissions

I. The Appellant (Opponent) lodged an appeal against the interlocutory decision of the Opposition Division which found that the European patent No. 1 864 969 amended according to the then pending 7th auxiliary request met the requirements of the EPC.

Claim 1 of this request reads as follows:

"1. A process for the production of toluene diisocyanate comprising:

a) hydrogenating dinitrotoluene in the presence of a catalyst selected from the group consisting of doped or undoped Raney nickel catalysts, doped or undoped nickel catalysts fixed to a support, and noble metal catalysts fixed to a support and loaded with one or more noble metals in the liquid phase with or without the use of an additional solvent at a temperature of from 120 to 180 °C, at a hydrogen pressure of from 20 to 40 bar, and at a dwell time in the reaction system of from 0.5 to 4 hours, to yield a crude toluenediamine mixture,

b) purifying the crude toluenediamine mixture, to yield a toluenediamine which contains a total of less than 0.1 % by weight of cyclic ketones, based on 100% by weight of the toluenediamine,

and

c) phosgenating the toluenediamine which contains a total of less than 0.1 % by weight of cyclic ketones, based on 100% by weight of the toluenediamine, to yield the toluene diisocyanate;

wherein the cyclic ketones are methyl-substituted, ethyl-substituted or unsubstituted cycloalkanones, cycloalkenones, aminocycloalkanones, aminocycloalkenones and cycloalkadiones

wherein step (b) comprises
first removing water of reaction, low boilers, ortho-toluenediamine, and, optionally, solvent, partially or completely from the crude toluenediamine mixture, and then separating high boilers and cyclic ketones either partially or completely from the meta-toluenediamine with the aid of a distillation column having an evaporator, a condenser and a stripping section with at least 3 theoretical plates, the separation being carried out at an absolute head pressure of from 50 to 2000 mbar, at a head temperatures of preferably from 140 to 320°C, and at a bottom temperatures of <260°C."

II. Notice of opposition had been filed by the Appellant (opponent) requesting revocation of the patent in suit in its entirety on the grounds of lack of novelty and inventive step (Article 100(a) EPC) and insufficient disclosure of the invention (Article 100(b) EPC). *Inter alia* the following documents were submitted in the opposition proceedings:

(1) EP-A-1 746 083
(2) US-A-2003/0230476
(3) CA-A-2 142 911
(4) GB 909 054
(5) WO-A-2005/066113
(10) Kirk-Othmer Encyclopedia of Chemical Technology, vol. 2, 1978, pages 321-329.

In its decision the opposition division held that the amendments made to the claims of the then pending 7th

auxiliary request fulfilled the requirements of Article 123(2) and (3) EPC. Further, it was found that the invention was sufficiently disclosed. Novelty of the claimed subject-matter with respect to documents (1), (3), (4), (5) and (10) was acknowledged. Starting from document (4) as the closest prior art, the technical problem underlying the patent-in-suit was seen in the provision of an alternative process for producing toluene diisocyanate (TDI) having lower coloration. The Opposition Division held that nothing in documents (3) and (5) taught the skilled person to reduce the impurities present in toluene diamine (TDA) when looking for alternative ways to reduce the coloration of TDI, let alone to reduce the content of cyclic ketones present in TDA. Hence, the Opposition Division concluded that the subject-matter of claim 1 of the then pending 7th auxiliary request involved an inventive step.

III. During the oral proceedings held on 31 January 2018 before the Board, the Respondent (Proprietor of the patent) defended the maintenance of the patent in suit on the basis of his main request which corresponds to the 7th auxiliary request pending before the Opposition Division, and an auxiliary request filed with the letter of reply to the statement setting out the grounds of appeal dated 29 July 2014. Claim 1 of the auxiliary request differs from claim 1 of the main request by the deletion of the wording "wherein the cyclic ketones are methyl-substituted, ethyl-substituted or unsubstituted cycloalkanones, cycloalkenones, aminocycloalkanones, aminocycloalkenones and cycloalkadiones".

IV. According to the Appellant, claim 1 of the main request has been amended in such a way that it contains

subject-matter which extended beyond the content of the application as filed and extended the protection conferred by the patent as granted. The late-filed auxiliary request should not be admitted in the appeal proceedings. If it were admitted, then the case should be remitted the Opposition Division to decide on the issue of insufficiency of disclosure. Furthermore, the claimed subject-matter did not involve an inventive step starting from document (10) as the closest prior art.

V. According to the Respondent, the scope of claim 1 of the main request was that of dependent claim 3 of the patent as granted. Therefore, scope of protection was not extended and the requirements of Article 123(3) were met. The auxiliary request was filed in response to the statement of the grounds of appeal concerning the issue of extension of the scope of protection. It should therefore be admitted into the proceedings. Document (10) could be seen as the closest prior art to the invention. The technical problem underlying the invention was to reduce the coloration of the TDI produced by the phosgenation of TDA. The solution was to purify TDA to a content of less than 0.1% by weight of cyclic ketones and to carry out a separation of the high boilers and cyclic ketones with a distillation column having a stripping section with at least 3 theoretical plates. The distillation column used to purify TDA in document (10) comprised at most two theoretical plates. By improving its distillation, the TDA used to prepare TDI contained fewer impurities. It was credible therefore that the problem of reducing the coloration of the TDI was solved by the claimed process. There was no pointer in document (10) which suggested improving the purity of the TDA in order reduce the coloration of the TDI, let alone to

specifically increase the number of theoretical plates in the stripping section of the second distillation. Furthermore, document (10) did not recognise that cyclic ketones in TDA were responsible for the coloration of TDI. Accordingly, the subject-matter of claim 1 of the auxiliary request involved an inventive step.

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

The Respondent requested that the appeal be dismissed or, subsidiarily, that the patent be maintained on the basis of the auxiliary request, filed with letter dated 29 July 2014.

VII. At the end of the oral proceedings, the decision of the Board was announced.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. Amendments (Article 123(3) EPC)

In claim 1 of the main request, the Appellant has deleted the requirement present in claim 1 of the patent as granted according to which the purified toluenediamine contains a total of less than 0.1% by weight of cyclic ketones, based on 100% by weight of toluene diamine. Instead of that, claim 1 of the main request now requires that the threshold of 0,1% by weight is based only upon the cyclic ketones listed in dependent claim 3, thereby extending the scope of the

granted claims, contrary to the requirement of Article 123(3) EPC).

The Respondent has not contested that the scope of amended claim 1 was broader than that of granted claim 1, but submitted that the scope of amended claim 1 was that of dependent claim 3 as granted. According the Respondent, there was no provision in the EPC forbidding that a dependent claim had broader scope than that of the independent claim upon which it depends.

However, a dependent claim must satisfy all requirements of the independent claim on which it depends, with the consequence that a dependent claim cannot have a broader scope than that of the independent claim on which it depends.

The process of claim 3 of the patent as granted is a process of claim 1, in which the cyclic ketones are methyl-substituted, ethyl-substituted or unsubstituted cycloalkanones, cycloalkenones, aminocycloalkanones, aminocycloalkenones and cycloalkadiones. Since the process of dependent claim 3 is a process according to independent claim 1, both the requirements of claims 1 and 3 have to be fulfilled. This means that claim 3 requires that the total amount of **all** cyclic ketones which remains in the purified toluene diamine is less than 0.1% by weight, based on 100% by weight of toluene diamine.

Accordingly, the scope of claim 1 of the main request is also broader to that of dependent claim 3 as granted.

Hence, the Respondent’s argument fails.

Auxiliary request

3. Admissibility

This request has been filed with the reply to the statement of the grounds of appeal. Hence, contrary to the Appellant's view, it is not late-filed (Article 12(1), (2) and (4) RPBA).

According to Article 12 (4) RPBA), the Board has nevertheless discretion to hold inadmissible requests which could have been presented in the first instance proceedings. The opposition division maintained the patent in an amended form according to the Respondent's then pending 7th auxiliary request. Filing further requests before the opposition division was thus not necessary. Hence, under the present circumstances, the Board does not see why an auxiliary request filed in response to the Appellant's appeal should be excluded from the appeal proceedings.

Therefore the auxiliary request is admitted into the appeal proceedings.

4. Remittal

The Appellant requested that the case be remitted to the Opposition Division if the auxiliary request were admitted into the proceedings

The justification put forward by the Appellant for its request to remit the case to the first instance was the right to have two instances for the issue of sufficiency of disclosure arising from the amendment. However, Article 111(1) EPC establishes no absolute

right for Parties to have matters raised in appeal proceedings examined by two successive instances; on the contrary, it leaves the Board of Appeal to decide upon a remittal in the light of the circumstances. In the present case, the Board and the Parties were in a position to address all issues raised in the appeal proceedings, said issues being in essence the same as those brought forward in front of the Opposition Division. Therefore, under the present circumstances, the Appellant's request to remit the case to the first instance is refused.

5. Inventive step

5.1 Closest prior art

The Board considers, in agreement with the Parties, that document (10) represents the closest state of the art to the invention. This document is a chapter of an encyclopaedia relating to toluene-2,4-diamine (TDA) and thus reflects the general knowledge of the skilled person.

This document discloses that TDA is mainly used for the preparation of toluenediisocyanate (TDI) by phosgenation (see abstract on page 321 and page 322). Document (10) furthermore indicates that TDA is obtained by hydrogenation of dinitrotoluene (DNT) in methanol at a temperature of from 120 to 140°C and at a pressure of from 24 to 35 bars (see page 325, first paragraph). The crude TDA is purified by first removing reaction water and ortho-toluenediamine by distillation under reduced pressure. TDA is then taken from the bottom of this distillation column and is redistilled to remove the heavy products. Typically the second distillation is carried out at a temperature of from

160°C to 180°C under a pressure of from 13 to 26 mbars (see page 326, first paragraphs and figure 3). The process yields more than 99% m-TDA. Document (10) further reports that merchant specifications indicates that TDA may contain impurities such as the ortho isomers (1.3 wt%), toluidines (0.05 wt%) and nitrobodies (0.03 wt%) (see table 3 on page 327). There is no information on the presence of cyclic ketones in the purified TDA.

5.2 Technical problem

According to the Respondent, the technical problem to be solved is to reduce the coloration of the TDI produced by the phosgenation of TDA.

5.3 Solution

According to the Respondent, the solution was the process of claim 1 including purifying TDA according to step b, characterized in that the separation of the high boilers and cyclic ketones from m-TDA is carried out with a distillation column having a stripping section with at least 3 theoretical plates **and** that the purified toluenediamine contains a total of less than 0.1% by weight of cyclic ketones.

Document (10) is silent about the presence of cyclic ketones in the purified TDA. The Opposition Division and the Appellant were of the view that the purified toluenediamine obtained by the process of document (10) also contained less than 0.1% by weight; the Respondent, argued, on the contrary, that there was no evidence that it was the case.

The Board notes that there is no disclosure or evidence to conclude whether or not cyclic ketones are present in the purified DTA obtained by the process according to document (10) in content above the claimed threshold of 0.1% by weight.

The Respondent argues that the improvement in lack of coloration of the TDI obtained by the claimed process compared to that obtained by process of document (10) is due to the fact that the cyclic ketones content in the TDA obtained by the claimed process is lower than that of the TDA obtained by the prior art process, i.e. below the threshold of 0.1% by weight.

According to the jurisprudence of the Boards of Appeal, each of the parties to the proceedings carries the burden of proof for the facts it alleges (see e.g. decision T 270/90, OJ EPO 1993, 725, point 2.1). In the present case, the Respondent alleges that the content of the cyclic ketones present in the TDA obtained by the process of document (10) is above the threshold of 0.1% by weight. Therefore, the burden of proof for that allegation rests upon him.

In the absence of any substantiating facts and corroborating evidence, the Board therefore considers the Respondent's allegation that cyclic ketones are present in the toluenediamine purified by the process of document (10) above 0.1% by weight as an unsubstantiated allegation, which thus is not to be taken into account by the Board.

The process of claim 1 also differs from the process of document (10) with regard to the indication of the dwell time in step (a) and the specification of the

head temperature/pressure and bottom temperature to carry out the distillation in step (b).

However, the Respondent did not rely on these features to characterise the proposed solution to the problem of coloration. Accordingly since these distinguishing features are not intended to contribute to the solution of lowering the colour of TDI, they should not be taken into account when assessing obviousness (see T 22/81, OJ EPO 1983, 226, points 5.1 and 7 of the reasons).

The Board therefore concludes that the solution proposed by the patent-in-suit is the process of claim 1 which is only characterised in that the separation of high boilers and cyclic ketones from mTDA is carried out with a distillation column having a stripping section with at least 3 theoretical plates.

5.4 Success

The Respondent relied on the knowledge of the skilled man in order to demonstrate that the claimed process was a solution to the technical problem defined above and submitted that it was credible that the problem was solved because the TDA obtained by an improved distillation contained fewer impurities which are responsible for the coloration of the TDI.

The Board shares this view and is therefore satisfied that the problem is solved by the subject-matter of claim 1.

5.5 Obviousness

It is general knowledge that obtaining a coloured reaction product, which must be normally colourless, is

due to impurities present in the reaction product. These may be formed from the reaction of by-products already present in the starting product. Hence, an obvious way to remedy a coloration problem is to purify the starting materials. Accordingly, the skilled person faced with undesirable coloration of the TDI would regard the purification of the starting TDA product as an obvious solution to reduce TDI coloration.

According to the Respondent there was nothing in document (10) which suggested improving the purity of TDA in order to obtain less coloured TDI.

However, the skilled man knows that impurities in starting materials may result in undesirable by-products in the end-product. The specification of commercial product generally indicates the presence of impurities (also see document (10); table 3 on page 327). In addition, document (10) points out that coloured by-product are formed by the presence of ortho-substituted TDA, which are other by-products formed in the production of the TDA. The Respondent's argument therefore cannot convince the Board.

One obvious way to improve the purification of the TDA is to improve its distillation. As the quality of the distillation column is expressed as a number of theoretical plates, improving distillation can be achieved for example by increasing the number of theoretical plates in the stripping section of the second distillation.

The Respondent argued that there were a lot of possibilities for the skilled man to increase purity of the TDA. There was nothing advising the skilled man to

specifically increase the number of theoretical plates in the stripping section of the second distillation.

However, it has not been shown that improving specifically this section of the distillation of the TDA is associated with an unexpected effect. Thus, the arbitrary choice to improve the purification of the TDA by using a distillation column having a stripping section with at least 3 theoretical plates lies within the routine activity of the skilled person faced with the problem of reducing the colour of the TDI.

The Respondent submitted that the invention was based on the discovery of a critical threshold for the content of cyclic ketones in the purified TDA, which provided the skilled person with tools which he can use to check the success of the distillation.

However, this argument fails, first because the claimed process does not include any step comprising measuring the content of cyclic ketone; and also because it has not been shown that the threshold of 0.1 wt% cyclic ketones is critical.

The Respondent furthermore argued that the invention was based on the recognition that cyclic ketones present in the TDA were responsible for the coloration of the TDI. As document (10) did not disclose the presence of cyclic ketones in the TDA, the skilled person would have had no incentive to specifically remove these compounds from the TDA.

However, this argument is irrelevant, since the skilled person does not need to recognise that cyclic ketones are responsible for the coloration of TDI to arrive at the subject-matter of claim 1 without inventive skill.

The skilled person faced with the problem of coloration of TDI aims to remove any impurities from TDA. By improving the distillation of TDA, the content of impurities, including the cyclic ketones, will be lowered, if they have not been already be removed by the process of document (10) –see point 5.3 above.

All argument of the Respondent being rejected, the Board concludes from the above that the subject-matter of claim 1 of auxiliary request 1 lacks an inventive step.

6. Other issues

The Appellant also submitted that the invention was not sufficiently disclosed. In view of the negative conclusion with regard to inventive step, a decision of the Board on this issue is unnecessary.

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:

D. Magliano P. Gryczka

Decision electronically authenticated