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Datasheet for the decision of 22 January 2015

Case Number: T 0383/12 - 3.3.10

Application Number: 04794521.7

Publication Number: 1670747

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Language of the proceedings: EN

Title of invention:
SEPARATION OF AROMATIC AMINE FROM A PHENOLIC COMPOUND

Patent Proprietor:
E.I. DU PONT DE NEMOURS AND COMPANY

Opponent:
Bayer MaterialScience AG

Headword:

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - all requests (no) - routine activity

Decisions cited:

Catchword:

Beschwerdekammern
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Chambres de recours

European Patent Office
D-80298 MUNICH
GERMANY
Tel. +49 (0) 89 2399-0
Fax +49 (0) 89 2399-4465

Case Number: T 0383/12 - 3.3.10

DECISION
of Technical Board of Appeal 3.3.10
of 22 January 2015

Appellant II: (Patent Proprietor)	E.I. DU PONT DE NEMOURS AND COMPANY 1007 Market Street Wilmington, DE 19898 (US)
Representative:	Morf, Jan Stefan Abitz & Partner Patentanwälte mbB Postfach 86 01 09 81628 München (DE)
Appellant I: (Opponent)	Bayer MaterialScience AG D-51368 Leverkusen (DE)
Representative:	BIP Patents c/o Bayer Intellectual Property GmbH Alfred-Nobel-Straße 10 40789 Monheim am Rhein (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 21 December 2011 concerning maintenance of the European Patent No. 1670747 in amended form.**

Composition of the Board:

Chairman	P. Gryczka
Members:	J. Mercey C. Schmidt

Summary of Facts and Submissions

I. Appellant I (Opponent) and Appellant II (Patent proprietor) lodged appeals against the interlocutory decision of the Opposition Division which found that European patent No. 1 670 747 in amended form met the requirements of the EPC. Claim 1 of the granted patent read as follows:

"A process for separation of an aromatic amine from a phenolic compound comprising contacting a product mixture with a base, to produce a base-treated mixture, introducing said base-treated mixture to a distillation apparatus, and distilling said base-treated mixture wherein said product mixture comprises an aromatic amine and a phenolic compound characterised in that the molar ratio of base to phenolic compound is in the range of from 0.5:1 to 10:1."

II. Notice of Opposition had been filed by Appellant I requesting revocation of the patent as granted in its entirety on *inter alia* the grounds of lack of inventive step (Article 100(a) EPC). *Inter alia* the following documents were submitted in opposition proceedings:

(1) US-A-1 823 026,
(2) JP-A-08295654 (English translation) and
(8) JP-A-49035341 (English translation).

III. The Opposition Division held that the subject-matter of the claims of the then pending main request, namely the patent as granted, and third auxiliary request were not novel over the disclosure of document (2) and that the first and second auxiliary requests did not fulfil the requirements of Rule 80 EPC. The subject-matter of the fourth auxiliary request was found to lack an inventive step in the light of document (8) as closest prior art, said document being considered closer than document (1), whereas the subject-matter of the fifth auxiliary request was found to be inventive.

IV. With letter dated 24 June 2014, Appellant II submitted auxiliary requests I to XIV and with letter dated 22 December 2014, it submitted auxiliary requests XV to XX, these requests superseding all previously filed auxiliary requests.

Claim 1 of auxiliary request I differs from claim 1 of the patent as granted (main request) in that the words "followed by" have been introduced before the feature "introducing said base-treated mixture to a distillation apparatus".

Claim 1 of auxiliary request II differs from claim 1 of the main request in that the words "produced in the preceding step" have been introduced into the feature "introducing said base-treated mixture to a distillation apparatus" directly after the wording "base-treated mixture".

Claim 1 of auxiliary request III differs from claim 1 of the main request in that the process is defined as being for the separation of aniline from phenol from a product mixture comprising aniline and phenol.

Claim 1 of auxiliary request IV differs from claim 1 of auxiliary request III in that the product mixture which is contacted with a base is prepared by "hydrogenating of nitrobenzene under liquid phase or gas phase in the presence of a hydrogenation catalyst".

Claim 1 of auxiliary request V differs from claim 1 of auxiliary request IV in that the base is defined as being selected from lithium hydroxide, sodium hydroxide, sodium hydrosulfide, sodium bisulfide, potassium hydroxide, potassium hydrosulfide, potassium bisulfide, calcium hydroxide, magnesium hydroxide, sodium bicarbonate, sodium carbonate, sodium sulfide, sodium oxide, magnesium oxide, calcium oxide, calcium carbonate, tetramethylammonium hydroxide, tetraethylammonium hydroxide, tetrapropylammonium hydroxide, tetramethylammonium bisulfide, tetraethylammonium bisulfide, or combinations of any two or more thereof.

Claim 1 of auxiliary request VI differs from claim 1 of auxiliary request IV in that the term "comprising" has been replaced by "consisting of" and the base is defined as being selected from potassium hydroxide, sodium hydroxide or a combination thereof.

Claim 1 of each of auxiliary requests VII, VIII and IX is identical to claim 1 of auxiliary request VI.

Claim 1 of auxiliary request X is directed to two separate embodiments, the first of which is identical to that defined in claim 1 of auxiliary request V.

Claim 1 of auxiliary request XI is directed to two separate embodiments, the first of which is identical to that defined in claim 1 of auxiliary request VI.

Claim 1 of auxiliary request XII differs from claim 1 of auxiliary request X in that the molar ratio of base to phenol is in the range of 1:1 to 4:1.

Claim 1 of auxiliary request XIII differs from claim 1 of auxiliary request VI in that the molar ratio of base to phenol is in the range of 1:1 to 2:1.

Claim 1 of auxiliary request XIV is directed to two separate embodiments, the first of which is identical to that defined in claim 1 of auxiliary request VI except that the term "consisting of" has been replaced by "comprising".

Claim 1 of auxiliary request XV differs from claim 1 of the main request in that the molar ratio of base to phenol is in the range of 1:1 to 2:1 and the base is defined as being selected from potassium hydroxide, sodium hydroxide or a combination thereof.

Claim 1 of auxiliary request XVI is identical to claim 1 of auxiliary request III.

Claim 1 of auxiliary request XVII is identical to claim 1 of auxiliary request IV.

Claim 1 of auxiliary request XVIII is identical to claim 1 of auxiliary request V.

Claim 1 of auxiliary request XIX is identical to the first embodiment defined in claim 1 of auxiliary request XII.

Claim 1 of auxiliary request XX is identical to claim 1 of auxiliary request VII.

V. Appellant II submitted that the subject-matter of all requests was inventive, document (8) representing the closest prior art, it being unrealistic that the skilled person would have started from outdated and old-fashioned technology as taught by document (1), aniline no longer being made by the ammonolysis process described in this document at the priority date of the disputed patent. Starting however from document (1), the problem to be solved was the provision of a separation process which was simpler and more economical, with an excellent balance of separation-efficiency, cost-efficiency, life and maintenance of the process equipment and reduced waste. This problem was solved by the use of a specific ratio of base to phenolic compound, the use of a lower amount of base resulting in the obtention of a high purity product in excellent yield, the process being milder, and leading to less waste and precipitates, and less corrosion of the process equipment. Document (1) referred merely to the addition of a "sufficient amount" of base, the skilled person understanding such an amount to correspond to a large excess, since document (1) taught that enough base had to be added not only "to neutralise and fix the phenol", but also to "break up the ammonia compounds and precipitate copper compounds". In addition, documents (2) and (8), which also related to the removal of phenolic compounds from aniline by addition of base and distillation, taught high molar ratios of base to phenolic compound, namely ≥3:1 and ≥27:1, respectively. Furthermore, document (1) did not teach the step included in several of the present auxiliary requests of forming the product mixture comprising arylamine and phenol by hydrogenation of a nitrobenzene, the passage in document (1) teaching that the method described therein was equally suitable for separating and purifying arylamines and phenols regardless of their origin being merely speculative and non-enabling.

With letter dated 26 April 2012, Appellant II submitted document (10):

(10) US-A-7 692 042

which related to a similar invention as that claimed in the patent in suit, wherein it was acknowledged that *vis-à-vis* the process of document (8), there was a clear advantage of using a molar ratio of base to phenol of 0.1:1 to 10:1.

Appellant II also submitted that the subject-matter of all requests was novel and sufficiently disclosed and that all amendments fulfilled the requirements of Articles 84 and 123(2) EPC and Rule 80 EPC.

VI. Appellant I argued that the subject-matter of claim 1 of all requests was not inventive and that document (1) represented the closest state of the art. The age of a document alone was not sufficient for it not to qualify as closest prior art. Document (1) was closer to the claimed subject-matter than document (8) as it was directed to the removal of phenol from arylamines, such as aniline, whereas phenol was not even mentioned in document (8). Should the difference to document (1) be seen in the presently claimed molar ratios of base to phenolic compound, said ratios were obvious, since document (1) taught the skilled person to use an amount of base sufficient to convert the phenol to the phenate, the skilled person knowing that this meant at least an equimolar amount and would need only to conduct routine experiments in order to convert this into a numerical molar amount. That using less alkali metal hydroxide led to less corrosion of the equipment and less precipitation was common general knowledge. For those auxiliary requests including the step of forming the amine by hydrogenation of a nitrobenzene, both documents (2) and (8) taught that aniline was generally produced by hydrogenation of nitrobenzene and the process of document (1) was specifically described as being equally applicable for the separation and purification of arylamines and phenols "however derived". With regard to document (10), this was published after the filing date of the patent in suit and was therefore irrelevant to the question of inventive step.

Appellant I also argued that one or more of the requests did not fulfil the requirements of one or more of Articles 54, 83, 84 and 123(2) EPC and Rule 80 EPC and should not be admitted into the proceedings for reasons of being late-filed.

VII. Appellant I requested that the decision under appeal be set aside and that the patent be revoked.

Appellant II requested that the decision under appeal be set aside and the patent be maintained as granted or, alternatively, on the basis of any of auxiliary requests I to XIV filed with letter dated 24 June 2014, or on the basis auxiliary requests XV to XX filed with letter dated 22 December 2014.

VIII. At the end of the oral proceedings held on 22 January 2015, the decision of the Board was announced.

Reasons for the Decision

1. The appeals are admissible.

2. For the purposes of procedural efficiency, the Board shall treat the 21 requests on file in two batches, as was the case in the oral proceedings before the Board, the first batch consisting of the main request and auxiliary requests I to III, XV and XVI, wherein in claim 1 of each request, only a process for the separation of a product mixture comprising an aromatic amine from a phenol is defined, the second batch consisting of auxiliary requests IV to XIV and XVII to XX, wherein in claim 1 of each request, the product mixture is additionally defined as being prepared by hydrogenation of nitrobenzene.

Main request and auxiliary requests I to III, XV and XVI

3. *Inventive step*

3.1 Independent claim 1 of each of auxiliary requests III and XVI is directed to an embodiment of the main request, namely to the separation of aniline from phenol, wherein the molar ratio of base to phenol is 0.5:1 to 10:1. In case this embodiment according to auxiliary requests III and XVI lacked inventive step, then the subject-matter claim 1 of the main request, which embraces this embodiment, cannot involve an inventive step either. The subject-matter of auxiliary requests I and II differs minimally from that of the main request, and that of auxiliary request XV, which is embraced by the main request (see point IV above), is also dealt with below. For this batch of requests, the subject-matter of claim 1 of auxiliary request III (which is the same as that of auxiliary request XVI) is examined first as to inventive step.

3.2 Claim 1 of auxiliary request III is directed to a process for separation of aniline from phenol by adding a base and distilling the resultant mixture. Such a process already belongs to the state of the art, namely to the disclosure of document (1) (see claim 6), which discloses a method of separating aniline from a relatively small amount of phenol, which comprises treating the mixture with an aqueous solution of an alkali metal hydroxide e.g. caustic soda (see page 1, line 75) in an amount sufficient to convert such phenol to phenate, removing water therefrom by distillation and then distilling said aniline from the resulting anhydrous mixture.

3.2.1 Appellant II argued that not document (1), but rather document (8), was the closest state of the art, since document (8) provided the better springboard to the invention. This was because the aniline mixture to be separated, as in the case of the mixture to be separated in the patent in suit, was prepared by hydrogenation of nitrobenzene, which produced product mixtures more similar to those to be purified according to the patent in suit. In contrast, in document (1) the aniline was prepared by the ammonolysis of chlorobenzene, said process no longer being used at the priority date of the patent in suit, such that it was unrealistic that the skilled person would have started from this document, the filing date of which was in 1929. Furthermore, this outdated process resulted in a product mixture very different from that to be purified by the method according to the patent in suit, namely with intolerable levels of phenol impurities, together with ammoniaThus, this amendment also cannot contribute to inventiveness of the subject-matter of claim 1 of this request *vis-à-vis* document (1). and copper compounds.

3.2.2 However, document (8) is concerned very generally with the elimination of colouring impurities from an aromatic amine formed by hydrogenation of an aromatic nitro compound (see page 2, first three paragraphs under point 3), and is not concerned at all with the removal of phenol, said compound not even being mentioned in document (8). In contrast hereto, claim 6 of document (1) is clearly directed to a method of separating aniline and phenol. In addition, the method by which the product mixture to be separated is made is not defined in claim 1 of auxiliary request III, said product mixture being defined merely as comprising aniline and phenol.

3.2.3 Thus, the Board considers, in agreement with Appellant I, that the process of document (1) represents the closest state of the art for the subject-matter of auxiliary request III and, hence, takes this document as the starting point when assessing inventive step.

3.3 In view of this state of the art, the problem underlying auxiliary request III as formulated by Appellant II is the provision of a separation process which is simpler and more economical, with an excellent balance of separation-efficiency, cost-efficiency, life and maintenance of the process equipment and reduced waste.

3.4 As the solution to this problem, claim 1 of auxiliary request III proposes adding base to phenol in a molar ratio of from 0.5:1 to 10:1.

3.5 The Board accepts that by selecting certain limits for the molar ratio of base to phenol, a good balance between separation efficiency on the one hand, and life and maintenance of the process equipment and reduced waste on the other hand, has been achieved. Thus, Example 3 of the patent in suit shows that by decreasing the amount of alkali metal hydroxide added, less phenol is removed. At the same time, it belongs to the common general knowledge of the skilled person, that alkali metal hydroxides are corrosive to metals and that inorganic salts precipitate out from aqueous solutions on removal of water by distillation, such that it is plausible that the addition of less alkali metal hydroxide to a product mixture leads to less corrosion of the apparatus used and to less precipitation upon distillation. The addition of base to phenol in a molar ratio of from 0.5:1 to 10:1 according to claim 1 thus represents a compromise between these two effects, since when one is improved, the other is simultaneously deteriorated. The limits chosen for this desired compromise are, however, arbitrary, since the desired purity of the aniline depends merely on practical needs. Thus, the Board holds that it is credible that the problem is solved.

3.6 Finally, it remains to be decided whether or not the proposed solution to the objective problem underlying auxiliary request III is obvious in view of the state of the art.

3.6.1 Document (1) teaches that sodium hydroxide (caustic soda) should be added "in an amount sufficient to convert such phenol to phenate" (see point 3.2 above) before distillation. It was not disputed that it belongs to the common general knowledge of the skilled person that the reaction of phenol with sodium hydroxide, is an acid-base reaction, and that from the stoichiometry of the reaction equation, the skilled person knows that theoretically a molar amount of sodium hydroxide is needed to convert the phenol to phenate. If, however, this particular acid-base reaction has an unfavourable equilibrium, then the skilled person also knows that it is necessary to add an excess of base to shift the reaction in the desired direction. Hence, document (1) implicitly teaches to add at least an equimolar amount of base to phenol, such that the skilled person would only need to conduct routine experiments in order to ascertain how much was actually necessary in practice. More particularly, faced with the problem of providing a separation process which is simpler and more economical, with an excellent balance of separation-efficiency, cost-efficiency, life and maintenance of the process equipment and reduced waste, it is obvious to select an amount of base to phenol at the lower end of the amount implicitly disclosed in document (1) and not to use an unnecessary excess, since it is well-known that sodium hydroxide is corrosive and leads to salt precipitation, thus producing unwanted waste (see point 3.5 above). Thus, the skilled person would conduct experiments to find out how little base he could add whilst still maintaining an acceptable level of removal of phenol, said acceptable level depending merely on the skilled person’s wishes and practical needs. The Board thus holds that the selection of the molar ratio of base to phenol in the range of from 0.5:1 to 10:1 is within the routine activity of the skilled person faced with the technical problem at hand, which is essentially to provide an excellent balance between separation- and cost-efficiency, and cannot provide the claimed process with any inventive ingenuity. For these reasons, the subject-matter of claim 1 is not inventive.

3.7 For the following reasons the Board cannot accept Appellant II's arguments designed for supporting inventive step.

3.7.1 Appellant II argued that document (1) taught merely that sodium hydroxide should be added in a "sufficient amount", said amount being unspecific, the skilled person understanding such an amount to correspond to a large excess, since document (1) taught that enough base had to be added not only to "neutralise and fix the phenol", but also to "break up the ammonia compounds and precipitate copper compounds" (see page 1, lines 74 to 79), resulting from the aniline having been prepared by the reaction of chlorobenzene and aqueous ammonia with a cuprous compound as catalyst. In addition, document (8), which also related to the removal of phenolic compounds from aniline by addition of base and distillation, taught molar ratios of base to phenolic compound of greater than or equal to 27:1.

However, document (1) teaches the skilled person not only what to do, but also why, since it provides the mechanism of the phenol removal, namely conversion to phenate, it being clear that the need to "break up the ammonia compounds and precipitate copper compounds" is only present when the reaction mixture to be treated is produced by the ammonolysis of chlorobenzene. Thus, the skilled person, when deciding how much base to add, would know that it was only necessary to take that part of the teaching of document (1) concerning ammonia and copper compounds into account when the aniline was comprised in the crude product of the ammonolysis process, but would otherwise merely follow the teaching of claim 6 to add an alkali metal hydroxide "in an amount sufficient to convert such phenol to phenate", the product mixture to be treated in claim 1 of auxiliary request III being defined only as comprising aniline and phenol. Hence, following the teaching of document (1) alone, the skilled person would arrive at molar ratio of base to phenol of 0.5:1 to 10:1, such that he would have no reason to consult document (8), wherein a greater amount of base is used. In any case, the amount of base used in document (8) is also not only for the removal of aminophenols, but also of any other colouring impurities.

3.7.2 Appellant II also provided document (10) as evidence that the present invention was indeed inventive over the prior art. Said document, which related to a similar invention as that claimed in the patent in suit, taught that there was a clear advantage in using a molar ratio of base to phenol of 0.1:1 to 10:1 *vis-à-vis* the higher amounts used in the process of, for example, document (8).

However, regardless of the fact that said document was published after the filing date of the patent in suit, the Board has in any case recognised that there are indeed advantages in using lower amounts of base (see point 3.5 above), but comes nevertheless to the conclusion that the process of the patent in suit is not inventive over document (1) (see point 3.6.1 above).

3.8 For these reasons, the subject-matter of claim 1 of auxiliary request III is not allowable for lack of inventive step pursuant to Article 56 EPC.

3.9 In these circumstances, since claim 1 of auxiliary request III is identical to claim 1 of auxiliary request XVI, and the process defined therein is encompassed by claim 1 of the main request (see point 3.1 above), the main request and auxiliary request XVI share the fate of auxiliary request III in that they too are not allowable for lack of inventive step pursuant to Article 56 EPC.

3.10 The subject-matter of claim 1 of auxiliary requests I and II differs from that of the main request, respectively, in that the words "followed by" have been introduced before the feature "introducing said base-treated mixture to a distillation apparatus" and the words "produced in the preceding step" have been introduced into the feature "introducing said base-treated mixture to a distillation apparatus" directly after the wording "base-treated mixture". Appellant II added this wording in an attempt to render the subject-matter novel *vis-à-vis* document (2) and conceded that it made no difference to the assessment of inventive step over document (1), said document also disclosing this order of steps, since the base-treated mixture formed therein is "thereupon distilled" (see page 1, lines 74 to 79). Thus, these amendments cannot contribute to inventiveness of the subject-matter of claim 1 of each of these requests *vis-à-vis* document (1).

3.11 The subject-matter of claim 1 of auxiliary request XV differs from that of auxiliary request III in that it is directed more generally to the separation of an aromatic amine from a phenolic compound, the added base, however, being restricted to potassium hydroxide, sodium hydroxide or a combination thereof, and the molar ratio of base to phenolic compound being restricted to 1:1 to 2:1.

3.11.1 However, since the closest prior art document (1) already discloses that the alkali metal hydroxide may be sodium hydroxide (see page 1, line 75), this amendment cannot contribute to inventiveness of the subject-matter of claim 1 of this request *vis-à-vis* this document.

3.11.2 With regard to the more restricted molar range of base to phenolic compound of 1:1 to 2:1, as indicated in point 3.6.1 above, it belongs to the activities deemed normal for the skilled person to optimise a physical parameter, in this case the amount of base to be added, in such a way as to reach an acceptable compromise between contradictory effects, namely separation and corrosion/waste, which are dependent on this parameter, according to his wishes and in view of practical needs. Furthermore, as also indicated in point 3.6.1 above, document (1) essentially teaches to add at least an equimolar amount of base to phenol, the presently claimed narrower range of 1:1 to 2:1 being close to such an equimolar amount. Thus, this amendment also cannot contribute to inventiveness of the subject-matter of claim 1 of this request *vis-à-vis* document (1).

3.11.3 Appellant II argued that the molar ratio of base to phenolic compound of 1:1 to 2:1 was now very low and narrow and hence even further away from the large excess disclosed in document (1), such that it was not suggested thereby.

However, Appellant II did not argue that by adding less base, the claimed process led to improved removal of phenol *vis-à-vis* the process of document (1). Indeed on the contrary, the table in Example 3 of the patent in suit shows that by reducing the amount of base added, less phenol is removed, only 60% removal being achieved at a ratio of 3.4:1. Moreover, any reduction in corrosion and precipitation was obvious (see point 3.6.1 above). Nor did Appellant II argue that the **combination** of specific bases and low ratio led to any special effect. Hence, this range of 1:1 to 2:1 is neither critical nor a purposive choice for solving the objective problem underlying the patent in suit, since no unexpected effect has been shown to be associated with this particular range.

3.11.4 Thus, the considerations having regard to inventive step with respect to auxiliary request III apply also to auxiliary request XV, i.e. the subject-matter claimed does not involve an inventive step.

Auxiliary requests IV to XIV and XVII to XX

4. *Inventive step*

4.1 Independent claim 1 of auxiliary request XIII is directed to an embodiment of all of auxiliary requests IV to XII, XIV and XVII to XX, namely to the separation of aniline from phenol consisting of hydrogenating nitrobenzene under liquid or gas phase in the presence of a hydrogenation catalyst to produce a product mixture, contacting said product mixture with a base selected from potassium hydroxide, sodium hydroxide or a combination thereof, to produce a base-treated mixture, distilling said base-treated mixture, wherein the molar ratio of base to phenol is 1:1 to 2:1. In case this embodiment according to auxiliary request XIII lacked inventive step, such a line of requests would mandatorily result in the conclusion that the subject-matter of auxiliary requests IV to XII, XIV and XVII to XX, which embrace this embodiment, cannot involve an inventive step either. For this reason, for this batch of requests, it is appropriate that the subject-matter of claim 1 of auxiliary request XIII is examined first as to inventive step.

4.2 Appellant II submitted that since in claim 1 of auxiliary request XIII, the product mixture was additionally defined as being prepared by hydrogenation of nitrobenzene, document (8) was now clearly the closest prior art, as it disclosed a process for the purification of an aromatic amine formed by hydrogenation of an aromatic nitro compound (see page 2, first paragraph under point 3), document (1) disclosing only a product mixture formed by ammonolysis of chlorobenzene.

4.2.1 However, the Board holds that the core of the present invention concerns the separation of aniline from phenol, document (8) not being directed to the removal of phenol at all. In any case, document (1) teaches (see page 2, lines 62 to 65) that the method described therein "is likewise equally adapted for separating and purifying mixtures of arylamines and phenols, generally, however, derived", the preparation of aniline from nitrobenzene being well-known to the person skilled in the art (see "Background of the Invention" in the specification of the patent in suit, page 2, lines 10 to 14). Hence, the Board considers, in agreement with Appellant I, that the process of document (1) also represents the closest state of the art for the subject-matter of auxiliary request XIII and, hence, takes this document as the starting point when assessing inventive step.

4.3 In view of this state of the art, Appellant II formulated the problem underlying auxiliary request

XIII in the same way as for that of auxiliary request XV (see point 3.3 above).

4.4 As the solution to this problem, claim 1 of auxiliary request XIII proposes that the product mixture is additionally defined as being prepared by hydrogenation of nitrobenzene and the molar ratio of base to phenolic is in the range of from 1:1 to 2:1.

4.5 Document (8) teaches that an aromatic amine is generally produced by hydrogenation of an aromatic nitro compound (see page 2, second paragraph under point 3), such that no inventive ingenuity was required in order to produce a product mixture comprising aniline and phenol by hydrogenating nitrobenzene under liquid or gas phase in the presence of a hydrogenation catalyst.

4.6 Appellant II argued that the product mixture formed by the ammonolysis process for producing aniline disclosed in document (1) was very different from that produced by catalytic hydrogenation, since the former contained ammonia compounds and cuprous compounds and much larger quantities, namely 3 to 8%, of phenol (see document (1), page 1, lines 26 to 35), whereas the catalytic hydrogenation of nitrobenzene resulted in quantities of phenol in the order of only 50 ppm, such that it was not just a matter of routine experimentation in order to determine how much base needed to be added. With regard to the statement in document (1) at page 2, lines 62 to 65 that "The herein described method is likewise equally adapted for separating and purifying mixtures of arylamines and phenols, generally, however, derived", Appellant II argued that said passage was merely speculative and non-enabling, it having been added by the drafter of document (1) merely to extend the coverage of the patent.

However, the process of document (1) is specifically described as being equally applicable for the separation and purification of arylamines and phenols "however derived" and the Board sees no reason why this statement in document (1) should not be read at face value, in particular since independent claims 5 and 6 of said document are directed to a general method for separating *inter alia* aniline from phenol, wherein, contrary to independent claims 1 to 4, the method by which the aniline is made is not defined in said claims.

In addition, as indicated in point 3.7.1 above, the need to "break up the ammonia compounds and precipitate copper compounds" is only present when treating the reaction mixture produced by the ammonolysis of chlorobenzene. When, as in the present case, the product mixture to be treated is defined as comprising aniline and phenol produced by catalytic hydrogenation of nitrobenzene, the skilled person knows that ammonia and cuprous compounds are not produced by such a reaction, and would thus merely follow the teaching of claims 5 and 6 to add an alkali metal hydroxide "in an amount sufficient to convert such phenol to phenate".

The Board also holds that a process which is known to be suitable for removing large quantities of phenol would *a fortiori* be suitable for removing lesser quantities, Appellant II providing no arguments as to why this should not be the case.

4.7 For these reasons, the subject-matter of claim 1 of auxiliary request XIII is not allowable for lack of inventive step pursuant to Article 56 EPC.

4.8 In these circumstances, since the process defined in claim 1 of auxiliary request XIII is encompassed by claim 1 of each of auxiliary requests IV to XII, XIV and XVII to XX, these requests share the fate of auxiliary request XIII in that they too are not allowable for lack of inventive step pursuant to Article 56 EPC.

5. *Other issues*

Appellant I also submitted that one or more of the requests did not fulfil the requirements of one or more of Articles 54, 83, 84 and 123(2) EPC and Rule 80 EPC, and/or should not be admitted into the proceedings for reasons of being late-filed.

In view of the negative conclusion in respect of inventive step for the subject-matter of all requests as set out in points 3 and 4 above, a decision of the Board on these issues 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:

Beschwerdekammern des Europäischen Patentamts
Boards of Appeal of the European Patent Office
Chambres de recours de l'Office européen des brevets

C. Rodríguez Rodríguez P. Gryczka

Decision electronically authenticated