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Datasheet for the decision of 2 August 2016

Case Number:	T 0385/13 - 3.3.06
Application Number:	99918835.2
Publication Number:	1077769
IPC:	B01J35/10, B01J23/40, B01D53/86, B01D53/94
Language of the proceedings:	EN

Title of invention:
CATALYTIC MATERIAL HAVING IMPROVED CONVERSION PERFORMANCE

Patent Proprietor:
BASF Corporation

Opponent:
Umicore AG & Co. KG

Headword:
High-porosity support / BASF

Relevant legal provisions:
EPC Art. 52(1), 54, 56, 83, 100(a), 100(b)
RPBA Art. 12(4), 13(3)

Keyword:

Late-filed evidence - justification for late filing (no)
Sufficiency of disclosure - (yes)
Novelty - (yes)
Inventive step - (yes)

Decisions cited:

T 0464/05, T 0482/09, T 0608/07

Catchword:

Beschwerdekammern
Boards of Appeal
Chambres de recours

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Case Number: T 0385/13 - 3.3.06

DECISION
of Technical Board of Appeal 3.3.06
of 2 August 2016

Appellant: (Patent Proprietor)	BASF Corporation 100 Campus Drive Florham Park, New Jersey 07932 (US)
Representative:	Herzog, Fiesser & Partner Patentanwälte PartG mbB Isartorplatz 1 80331 München (DE)
Respondent: (Opponent)	Umicore AG & Co. KG Rodenbacher Chaussee 4 63457 Hanau-Wolfgang (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 28 November 2012 revoking European patent No. 1077769 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	B. Czech
Members:	P. Ammendola
	C. Heath

Summary of Facts and Submissions

I. This appeal is against the decision of the Opposition Division revoking European patent No. 1 077 769.

II. Claim 1 of the patent as granted (below **claim 1**) reads as follows:

"*1. A catalytic material comprising a platinum group metal component dispersed on refractory inorganic oxide support phase, the support phase comprising a high porosity first support material comprising alumina having a pore volume greater than 0.5 milliliter per gram (ml/g), wherein at least 20 percent of the pore volume of the first support material is provided by pores that have a pore radius greater than 9 nm (90 Ångstroms) and the high porosity first support material has an average pore radius in the range 9 to 18 nm (90 to 180 Ångstroms), the catalytic material being in a particulate form having a particle size in the range of from 1 to 100 µm (microns) and disposable in a liquid to form a slurry.*"

Dependent claim 10 as granted reads:

"*10. The catalytic material of claim 9 further comprising a non-high porosity support material having a pore volume of less than 0.5 mg/g.*"

Granted claims 2 to 15 are directed to preferred embodiments of the catalytic material claimed.

Granted claims 16 to 19 a "*method for converting at least one of hydrocarbons, carbon monoxide and* NO_X *in a gas stream*" to carbon dioxide, water and/or nitrogen, comprising flowing the gas stream in contact with a catalytic material as defined in any one of claims 1 to 15.

III. The patent had been opposed on the grounds of lack of novelty and lack of inventive step (Article 100(a) EPC).
The prior art documents cited in the opposition proceedings include

D1 = DE 43 16 508 A1.

The Opposition Division of its own motion raised an objection under Article 100 b) / 83 EPC focusing, *inter alia*, on the lack of disclosure in the patent in suit as to how to establish whether the "*high porosity first support material*" (below **HP support material**) of a catalytic material as claimed possessed the three high porosity properties defined in claim 1 (below also cumulatively referred to as **the HP properties**), i.e

- a "*pore volume*", also referred to in the patent specification as "*total pore volume*", greater than 0.5 ml/g;

- a distribution of the pore volume in function of the pore radius (see also Figure 1 of the patent) according to which "*at least 20 percent of the pore volume is provided by pores with a radius greater than 9 nm*";

and

- an "*average pore radius*" in the range of 9 to 18 nm.

IV. In the appealed decision, the Opposition Division concluded that the invention was insufficiently disclosed (Articles 100(b) / 83 EPC), based on the following considerations set out in the Reasons:

"2.2.6 Without knowing how to verify whether the average pore radius and the pore volume fall within the claimed range, the skilled person cannot provide the catalytic material of claim 1."

"2.3.6 The present patent is silent on the porosity properties of the inorganic support when comprised in the final catalytic material. The present patent is also silent on how to perform the impregnation, ball milling, and calcination steps, without affecting the porosity properties of the alumina starting material. In the absence of any evidence to the contrary, there is no basis to assume that the initial properties of the alumina used as starting material are retained in the catalytic material."

The Opposition Division also concluded that claim 1 of the patent in suit lacked novelty over D1 (Articles 100(a) / 54(1)(2) EPC), since this document disclosed (see Reasons 4.1 to 4.6)

- catalyst layers with a thickness of 10 to 100 µm, formed of a catalyst composition which necessarily had to have a particle size of less that 100 µm; and
- that these layers could be obtained starting from the catalytic compositions whose porosity properties were indicated in the "Tabelle 1" of D1.

Since the novelty and sufficiency objections also applied to the claims of the pending auxiliary requests, the patent was revoked.

V. In its statement of grounds of appeal the Appellant (Patent Proprietor) defended the patent in the granted version (main request). It nevertheless filed, two sets of amended claims as Auxiliary Requests 1 and 2; and, *inter alia,* document

ER: an experimental report labelled "Technical Data" in support of its view regarding sufficiency.

VI. In its reply, the Opponent (Respondent) maintained objections regarding sufficiency, novelty over D1 nad inventive step, referring to new items of evidence including

D15 = EP 0 804 274 B1

allegedly filed in reaction to the filing of document ER, the relevance of which it disputed.

VII. The Parties were summoned to oral proceedings. In a communication issued in preparation therefor, the Board gave its provisional opinion on some particular aspects of the Parties' arguments and requests.

VIII. Under cover of two further letters, the Respondent filed further items of evidence, including documents

D15a = WO 96/22148 (the application having led to the grant of patent D15)

and

D18 = "TEST REPORT - Determination of pore size of unmilled and milled alumina" .

IX. With letter dated 1 July 2016, the Appellant filed an

amended set of claims as Auxiliary Request 3.
In further letter, the Appellant requested the Board not to admit any of documents D15a and D18 and asked for consideration of further, newly filed experimental data ("Technical Data II") supposed to corroborate the non-relevance of the data in D18.

X. Oral proceedings took place on 2 August 2016.
The following issues were controversially debated:
- the construction of claim 1;
- novelty (claim 1) over D1;
- sufficiency of disclosure and, in this connection,
- admissibility of D18 into the proceedings.

XI. Requests

The Appellant requested that the decision under appeal be set aside and the patent be maintained as granted (Main Request) or on the basis of the claims according to one of Auxiliary Requests 1 or 2, both filed with the grounds of appeal, or Auxiliary Request 3, filed with letter dated 1 July 2016.

The Respondent requested that the appeal be dismissed.

XII. The submissions of the Appellant of relevance here may be summarised as follows.

Non-admissibility of D18

The experimental report D18 should not be admitted considering its lack of *prima-facie* relevance and because of its late filing only one month before the oral proceedings that took the Appellant by surprise. This late filing was not justifiable, since D18 was apparently supposed to confute the technical data already filed as document ER by the Appellant three years before, with its statement of grounds of appeal. Thus, D18 could and should have been prepared and filed at a much earlier date.

Sufficiency of disclosure

- As also observed by the Opposition Division (see Reason 2.3.6 of the decision already cited above), the support material had to display HP features mentioned in claim 1 "when comprised in the final catalytic material".

- However, in terms of the materials making up the catalyst material according to claim 1, the latter mandatorily required only a Pt-component "*deposited*" on a HP alumina.

- The porosity properties measured on any embodiments of the claimed catalytic material only comprising alumina and the usual, very limited amounts of Pt-component deposited thereon essentially coincided with the porosity properties of the alumina present therein. Hence, in all those embodiments of claim 1 that were made of just these two mandatory ingredients, the occurrence of the HP features in the support material could be directly assessed by measurements of porosity of the final catalytic material.

- In any case, the person skilled in the art would gather from the total disclosure provided by the patent in suit, including the description of the porosity properties required for the starting alumina in [0029] and the porosity data given for the starting alumina used in examples 1 and 2 and in Figure 1, that the claimed final catalytic material can be prepared starting from an alumina that already possessed the required HP properties. Moreover, the only mandatory processing steps for depositing thereon the Pt-component were those defined in [0027] (lines 28 to 30 on page 4), i.e. the steps of impregnating the HP alumina with a solution or suspension of the Pt-component and drying. The mild nature of these processing steps would manifestly leave substantially unaltered the HP properties of the starting alumina. These HP properties were thus also (implicitly) disclosed as predictable properties of the alumina as comprised in the final catalytic materials.

- When carrying out embodiments of the invention which required a milling step, similar to those described in "*Example 1*" (see [0039]), any reasonable way of performing this suggested wet ball milling would leave the porosity properties of the starting HP alumina substantially unaltered.

  However, in the theoretical case that a skilled person would indeed fear that certain conditions of wet ball milling might substantially alter the structure of the starting HP alumina, he would also know how to verify whether or not the conditions used for wet milling were sufficiently mild. This information was manifestly obtainable by just carrying out a "simulation" of the milling treatment on the starting HP alumina *per se* (i.e. before any Pt deposition), and then checking whether the milled alumina still displayed the HP properties required according to claim 1.

- As to the reproducibility of embodiments of the subject-matter of claim 1 that were obtainable by the preferred processes of the invention in which the HP supported material (already impregnated with the Pt-component) also underwent calcination (possibly followed by milling), the skilled person would also know which calcination conditions were sufficiently mild to result in no substantial change of the porosity properties of the starting HP alumina.

The self-evident concept of "simulating" possible processing steps on the HP alumina *per se* and then verifying that the processed alumina still displayed required HP properties, also permitted to identify the conditions of calcination (or of calcination and subsequent milling) that did not substantially alter the porosity properties of alumina.

- The preferred embodiments of the patented catalytic material defined in granted dependent claim 10 (wording under II, *supra*) which required the presence of a second "*non-high porosity support material*", were also reproducible. Such embodiments could be prepared without any calcination. If, however, a skilled person intended to reproduce in particular "calcined" variants of such embodiments, then there was no necessity to calcine mixtures of alumina. In particular in the hypothetical case that, as alleged by the Respondent, the calcination of a mixture of alumina particulates could be expected to result in particles having "mixed microstructures", the skilled person would rather prepare catalytic materials according to claim 10 by simply mixing two catalytic materials, each previously separately prepared only using one kind of alumina (e.g. either the HP alumina or the "*non-high porosity*" alumina).

- The Respondent's argument that there existed (for each of the HP properties) several equally suitable conventional measuring methods could not justify an insufficiency attack. The person skilled in the art reading the patent in suit knew which among the conventional methods was the most suitable for measuring each of the HP properties. Moreover, the mere allegation of the existence of such alternative methods was in any case not enough, since the Respondent had failed to provide any evidence demonstrating that the values determinable (for one or the other of the three relevant porosity properties) on a same sample by using different methods were indeed appreciably different, let alone that these values were so different as to render impossible to carry out the invention. In the absence of any such evidence supporting the Respondent's allegation, there was no reason to doubt that many alumina were available to the skilled person whose porosity properties as measurable by any of the (allegedly equally suitable) conventional measuring methods were, with certainty, within the ranges defined in claim 1. Even assuming the Respondent had actually proven the alleged existence of some alumina for which the values measured with different methods were so different as to render impossible any conclusion as to whether the catalytic materials prepared therefrom would or not be embodiments of the invention, any such limited uncertainty, if proven, would at most be an issue of lack of clarity as to the boundaries of the claim.

Hence, none of the Respondent's lines of argument represented serious grounds supported by verifiable facts possibly justifying the conclusion that the claimed invention was insufficiently disclosed.

Novelty

The novelty objection raised in view of the catalytic materials disclosed in D1 was to be rejected, if only because none of these materials displayed necessarily the combination of the porosity properties disclosed in "Tabelle 1" and the particle size required for producing a catalyst layer on the carrier of 10 to 100 µm (see page 4, lines 38 to 39, of D1).

Inventive step

The closest prior art was represented by the comparative oxidation catalyst comprising the alumina "A" as support material as described in "*Example 1*" of the patent in suit.

The technical problem solved was that mentioned in the patent in suit (paragraphs [0001] and [0025]), i.e. the provision of an oxidation catalyst with improved performance in the conversion of the unwanted components of exhaust gases.

The Respondent's allegation that increasing the porosity of an oxidation catalyst would be a self-evident measure when seeking to favour the aimed conversion, had to be disregarded, since no such teaching was contained in any of the prior art documents already on file.

Nor would any such teaching be present in document D15a which did not even mention the porosity of the cited alumina. Hence, also this document, filed unjustifiably late and thus not be admitted into the appeal proceedings, could not possibly confer any credibility to the Respondent's allegation and was also manifestly irrelevant.

The Respondent's line of reasoning was thus essentially based on an unsupported allegation deprived of any credibility. Accordingly, the Respondent had also failed to render plausible that the subject-matter of granted claim 1 was obvious in view of the prior art.

XIII. The relevant counter-arguments of the Respondent may be summarised as follows.

Admissibility of D18

The experimental data D18 should be admitted into the proceedings since they had been filed in reaction to the communication of the Board of 20 June 2016. In this communication, the Board had expressed the preliminary opinion that it was inclined to admit into the appeal proceedings the Technical Data filed by the Appellant with the statement of grounds of appeal.

Insufficiency of disclosure

- The HP properties mentioned in claim 1 were indeed conventionally measured on porous materials, using conventional methods. However, claim 1 required these properties to be present in the HP support material "when comprised in the final catalytic material". No methods suitable for directly determining the occurrence of such properties in the final product were generally known to the skilled person or disclosed in the patent in suit.

- The definition of the invention in claim 1 also embraced catalytic materials obtainable by simply depositing the Pt-component onto a HP alumina, by e.g. impregnation and drying. However, even in such embodiments, due to the presence of the Pt-component deposited thereon, the porosity properties directly measurable on the final catalytic material could not be presumed to be the same as the corresponding porosity properties of the HP support component present therein.

- The whole disclosure of the patent in suit indeed appeared to suggest to the skilled person to prepare the catalytic materials as claimed by starting from an alumina already possessing the HP properties and by depositing thereon the Pt-component. It was, however, technically not reasonable to expect that the processing steps disclosed in the patent in suit as necessary or preferred in producing the claimed catalytic materials would not result in changes of the porosity properties of the alumina support material. This applied in particular to the milling step (possibly required to achieve the claimed particle size and used in the preparation of the samples according to the invention exemplified in the patent in suit), and even more so to the "preferred" calcination step (see [0027]), which normally caused the formation of agglomerates of the alumina particles and, thus, also normally implied a subsequent milling step.

- The Appellant's allegations that the skilled person would know which calcination and/or milling conditions were sufficiently mild to ensure that the porosity properties of the starting alumina were retained were not supported by evidence and, thus, disputed.

- The person skilled in the art could identify such sufficiently mild conditions for calcination and/or milling by carrying out a "simulation" of these processing steps on the HP alumina *per se*. However, reproducing in particular the "calcined" variants of the preferred embodiments of the patented catalytic material defined in granted claim 10 (which required the presence of a second "*non-high porosity support material*") would necessarily comprise calcining and milling mixtures of two alumina (of which only one was an HP alumina). Since such processing steps, applied to mixtures of different alumina, inevitably resulted in particles having "mixed microstructures", any "simulation" possibly carried out onto the HP alumina only could not allow any predictions of the porosity properties of the HP support material present in the final product.

- In any case, it was well-known that there were several conventional methods equally suitable for measuring the HP properties. This implied that different values could be determined for each or some of the three HP properties of a same given material. Hence there were at least some alumina for which the different values measured with different methods rendered impossible any conclusion as to whether the catalytic materials prepared therefrom would or not be embodiments of the invention. As established in a similar case in decision T 464/05, already this uncertainty *per se* justified the conclusion that the patented invention had been insufficiently disclosed.

Lack of novelty

D1 disclosed novelty-destroying catalytic materials whose HP properties were reported in "Tabelle 1" and whose particle size had necessarily to be as required claim 1 at issue, since D1 itself required on page 4, lines 38 to 39, that the catalytic materials described had to be used for producing a catalyst layer on the carrier of preferably 10 to 100 µm in thickness.

Lack of inventive step - obviousness

The closest prior art was indeed the sample that was described in "*Example 1*" of the patent in suit and comprising the alumina "A".

The technical problem solved vis-à-vis this prior art was the provision of an catalyst with improved performance as regards the conversion of the unwanted components of exhaust gases.

However, it was self-evident to the skilled person that an increment of the porosity of an oxidation catalyst would favour the conversion performance of the catalyst. Hence, it would be obvious to solve the technical problem by replacing the non-high porosity alumina used as support material in the catalysts of the closest prior art by e.g. a HP alumina, thereby arriving at the subject-matter of claim 1 at issue without any inventive skills.

D15a evidenced that a certain alumina (supposedly a HP alumina) had already been used for producing such catalysts.

Reasons for the Decision

Procedural issues

1. Admissibility - Experimental report D18

1.1 Article 12(2) RPBA stipulates *inter alia* that the reply to the statement of grounds of appeal should contain the Respondent's complete case. Furthermore, Article 13(1) RPBA stipulates *inter alia* that any amendment to a Respondent's case after it has filed its reply may be admitted and considered at the Board's discretion, to be exercised in view of *inter alia* the complexity of the new subject matter submitted, the current state of the proceedings and the need for procedural economy.

1.2 The Appellant had filed, *inter alia* document ER ("Technical Data") under cover of the statement of grounds.

1.3 In its reply to the statement of grounds of appeal, the Respondent limited itself to call into question the relevance of test report ER, without requesting non-admittance of ER into the proceedings. On the contrary, the filing of ER was explicitly mentioned as the justification for the Respondent's reference to a further new document (i.e. D15).

1.4 The Respondent then filed its own Test Report D18 only one month before the oral proceedings. The experimental data presented in D18 are a manifest counter-evidence to the Appellant's test report ER, D18 being supposed to prove the opposite of what the Appellant sought to demonstrate, as regards sufficiency, by filing ER.

Nevertheless, the Respondent attempted to justify the late filing of D18 stating that this document was provided in reaction to the communication issued by the Board in preparation for the oral proceedings.

1.5 In this communication (point IV.(b)), the Board identified the reasons of the contested decision that the Appellant aimed to rebut by means of the filing of ER, and expressed the preliminary opinion that the data of ER appeared to admissible.

The Board holds that this preliminary opinion (which could be expected to be either positive or negative) cannot possibly have taken the Respondent "by surprise". Thus, it cannot justify the Respondent's decision to prepare and file (without previous announcement) experimental counter-evidence more than three years after the filing of ER with the Appellant's statement of grounds.

1.6 The Board concludes, therefore, that the filing of experimental D18 could and should have occurred, or at least been announced, with the Respondent's reply to the statement of grounds.

Hence, the Board, considering that the unannounced filing of this experimental counter-evidence only one month before the oral proceedings is not compliant with the need of procedural economy and at a very late stage of the proceedings gave rise to further questions regarding its possible relevance and probatory force and/or conventional nature of the acidic conditions apparently used in the milling step of the experiments described in D18, thus considerably increasing complexity of the case.

1.7 Accordingly the Board, in exercising its discretion under Article 13(1) RPBA and Article 114(2) EPC, decided not to admit D18 into the proceedings.

Main Request (patent as granted)

2. Sufficiency of disclosure

2.1 At the oral proceedings before the Board, it was common ground between the Parties that claim 1 as granted (wording under II, *supra*) is to be construed as follows:

The claimed catalytic material is in "*particulate*" loose ("*dispersable*") form, and has a particle size in the range of from 1 to 100 µm. It comprises:

(a) a platinum group metal component (herein below **Pt-component**) "*dispersed on*"

(b) a refractory inorganic oxide support phase comprising

a HP support material which must:
- comprise alumina
- dis display the three specified HP properties (see III, above).

The Parties also concurred with the conclusion of the Opposition Division that claim 1 at issue implied that the HP features of the HP support material must be displayed by this latter while it is "comprised in the final catalytic material" (see point 2.3.6 of the decision under appeal quoted under IV, *supra*).

3. According to the established case law of the Boards of Appeal an objection of insufficiency presupposes serious doubts, substantiated by verifiable facts.

3.1 In the present case, the insufficiency objections are all based on the undisputed facts that the patent in suit

- does not explicitly describe a measuring method for establishing the occurrence of the required HP properties in the HP support material as present in the "*catalytic material*" claimed, and
- does not explicitly identify other measures (e.g. to be taken during the preparation of the catalytic material) as inevitably resulting in the occurrence of the required HP properties in the support material of a so-prepared catalytic material.

Given the absence of such disclosure, the Respondent presented the following distinct lines of argument:

(i) There was no known porosity measuring method suitable for determining the occurrence of the required HP properties in the support material present in a sample of a final catalytic material as claimed.

(ii) The disclosure in the patent in suit did not enable the skilled person to carry out the invention by relying on porosity measurements only made on the alumina used as starting material in the preparation of a (final) catalytic material as claimed.

(iii) In any case, due to the existence of several equally suitable methods for measuring each of the relevant porosity properties (on samples of the final catalytic material and/or of the alumina used as starting material), the disclosure content of the patent in suit was not sufficient to permit carrying out the invention.

These three lines of argument, all rebutted by the Appellant, are addressed separately herein below at points 3.2, 3.3 and 3.4.

3.2 Argument (i)

3.2.1 The Board notes that the HP properties referred to in claim 1 are conventionally used to describe the porosity of porous materials and, thus, may routinely be measured by the person skilled in the art on samples of such porous materials (e.g. alumina). This was also common ground between the Parties.

3.2.2 In the opinion of the Appellant, in many embodiments of the invention, using any of these conventional measuring methods with a sample of the final catalytic material would substantially amount to measuring the porosity properties of the HP support material present therein.

This was disputed by the Respondent, who argued *inter alia* that, for instance, the deposited Pt-component might reduce the free pore radius of the support material and interfere with the measurement of the pore volume.

3.2.3 However, for the reasons given at points 3.3.2 to 3.3.9 below, the Board accepts that the skilled person can actually carry out the invention without having to rely on measuring porosity properties of a sample of the (final) "*catalytic material*".

Accordingly, it was not necessary for the Board to come to a conclusion regarding the availability of known measuring methods for determining the occurrence of the required HP properties in the support material present in a sample of a (final) catalytic material as claimed. Argument (i) is therefore not considered any further.

3.3 Argument (ii)

3.3.1 The Board preliminarily notes the following:

- The patent in suit provides general information as to the process to be used for depositing the Pt-component on the HP alumina and gives explicit guidance on the porosity properties that this starting ingredient should possess (see paragraphs [0027] and [0029]). In particular, it is apparent in view of paragraph [0027] (sentence at lines 28 to 30 of page 4) that the catalytic material as defined in claim 1 can be prepared by means of two processing steps only, namely by simply impregnating, with a liquid containing the Pt-component, the alumina and subsequent drying. A calcination step is, however, also presented as "*preferable*" in this context.

- A similar disclosure is given in "*Example 1*" of the patent in suit, describing the preparation of comparative and invention samples based on the use of alumina of different porosity. Indeed, also the numerical values (or ranges of values) given in the Tables IA and IB for the total pore volume, average pore radius values and pore size distributions - these latter being also reported in Figure 1 - are undisputedly those of the starting alumina as such. Moreover, also in the preparation method described in paragraph [0039] belonging to "*Example 1*", each of the three alumina used (A, B: non-high porosity; C: HP) is merely "*impregnated*" with a solution of the Pt-compound, wet ball milled to provide the required particle size and then "*decanted*" (before forming it into a slurry for "wash-coating" an honeycomb carrier).

- The (only other) "*Example 2*" instead refers to invention examples prepared using both an HP alumina and a non-high porosity support material, namely a conventional "*medium porosity*" alumina. This example mentions no porosity value for any of the two sorts of alumina and refers generically to the same preparation method used in Example 1 (see the first sentence in [0042]).

3.3.2 The Board is convinced that the skilled person reading the patent in suit would immediately note the particularly mild nature of the processing steps mandatorily required (in [0027]) for preparing the claimed catalytic material. Hence, and also considering the instruction to use, as starting material, an alumina that already possesses HP properties required according to claim 1 the final material, the person skilled in the art would necessarily conclude that the mild processing steps described in [0027] for depositing the Pt-component onto the alumina must (be expected or known to) produce no substantial changes in its porous structure (i.e. of its HP properties). Therefore, in order to carry out the invention, the person skilled in the art is not prompted to search for measuring methods to which a sample of the final catalytic material may be subjected in order to allow a directly quantitive determination of the porosity properties of the alumina support material present therein. Upon reading the patent in suit, he is rather directed to choose, as starting alumina, one of those (apparently and undisputedly commercially available) having the porosity properties required by claim 1 for the alumina support material as comprised in the final catalytic material, and then to deposit the Pt-component thereon by means of mild processing steps (e.g. just impregnation and drying steps), while retaining the HP properties of the starting alumina.

3.3.3 The Respondent nevertheless argued that the porosity properties of the starting alumina would be substantially changed in those processing steps (different from the simple impregnation and drying) that were necessary when carrying out many other conceivable embodiments of the invention. It referred in particular to:

- the milling step which was possibly required to achieve the particle size described in claim 1, as disclosed in [0039] for preparing the sample according to the invention in "*Example 1*" (and apparently also used in the only other described example, i.e. "*Example 2*", see [0042]), and
- the calcination step disclosed as preferred in [0027], which would additionally require some grinding or milling in order to break down the agglomerated particles inevitably formed during calcination.

Hence, in order to carry out embodiments of the invention similar to those exemplified in the patent in suit and/or those obtainable by the particularly preferred preparation method which required a calcination step, it would not be sufficient to start from an alumina already possessing the HP properties.

3.3.4 The Board is not convinced by this line of argument for the following reasons.

Firstly, no size reduction step (e.g. wet ball milling) is indicated in [0027] as mandatory or preferred. Thus, many embodiments of the invention can manifestly be carried out without performing any milling, e.g. by choosing as starting alumina, an HP alumina which is already in the form of fine particles with a particle size well within the claimed range of 1 to 100 µm, and then impregnating such HP alumina with the Pt-component and drying it. Indeed, in the absence of evidence showing the contrary, the Board accepts that the deposition of (normally a few weight percent) of a Pt-component onto an HP alumina just by impregnation and drying is not expected to substantially change the particle size of the starting particulate alumina.

Secondly, the patent in suit also discloses how to realize those embodiments of the invention that do require milling (e.g. when starting from HP alumina particles larger than 100 µm or in case impregnated fine alumina particles have undergone a calcination step that has caused agglomeration among the fine particles). This can be done, in particular, by using the - manifestly mild - wet ball milling method indicated in [0039] of "*Example 1*" under appropriate conditions. Indeed, as convincingly observed by the Appellant and undisputed by the Respondent, it is self-evident to the person skilled in the art (especially in case the latter feared that even the very mild wet ball milling could possibly alter the porosity properties of the HP alumina) to carry out a "simulation" of the wet milling step on the HP alumina *per se* (i.e. to carry out the same milling step that one intends to use on the already impregnated alumina during the preparation of the catalytic material of the invention on a sample of the starting alumina). The Board is convinced that carrying out such "simulation" is a self-evident way to identify which conditions of wet ball milling can actually reduce, as required, the particle size of an HP alumina starting material without substantially disrupting its HP properties. Of course, the use of the same conditions of milling on the HP alumina after impregnation also justifies the expectation that the alumina support material present in the catalytic materials obtained therefrom still possesses substantially the same HP properties measured on the alumina *per se* at the end of the "simulation".

3.3.5 As to the embodiments of the invention in which the catalytic material has been calcined (and, thus, also subsequently milled if necessary) the Board stresses that the calcination step is described as "preferred" in [0027]. Hence, it may be of particular relevance in view of sufficiency of disclosure to consider whether or not the patent in suit enables the skilled person to prepare the "calcined" variants of the claimed catalytic materials.

The Board disregards as unconvincing the Appellant's unsupported allegation, disputed by the Respondent, that calcination conditions that can be applied to porous alumina so as to substantially retain the porosity properties of the starting alumina would belong to the relevant common general knowledge.

The Board finds however convincing the consideration of the Appellant (substantially identical to that discussed above for the reproducibility of the embodiments of the invention involving milling steps) that also for the reproducibility of the "calcined" (or "calcined" and then "milled") variants of the patented catalytic material, the skilled person would contemplate the self-evident concept of "simulating" any (possibly too-harsh) processing steps on the HP alumina *per se* and then verify whether the required HP properties are retained in the processed alumina.

3.3.6 The Board also holds (as emphasised by the Respondent) that the disclosure provided by the patent in suit has to enable the skilled person to also carry out the further preferred embodiments of the catalytic material of the invention that are defined in claim 10 as granted (see II above), i.e. those also comprising "*a second non-high porosity support material*" such as a **l**ow- or **m**edium-**p**orosity **alumina** (herein below **L/MP alumina**).

3.3.7 The Respondent has stressed that "*Example 2*" of the patent gives no guidance as to the preparation method actually used for the preparation of the disclosed samples comprising two alumina of different porosity. In addition, in the opinion of the Respondent, it would be impossible to establish the occurrence of the required HP properties in the HP support material comprised in the final catalyst composition, in particular when the L/MP alumina and the HP alumina were combined to form a single mixture of support materials that was thus impregnated, dried, calcined and, possibly, milled. This would be due to the fact that particles with "mixed microstructure" were likely to be formed during calcination of such mixture of alumina. In such particles with mixed microstructure the portion corresponding to a more porous alumina was not even necessarily identifiable, let alone separately characterizable in terms of its porosity properties. Hence, the presence in the calcined catalytic material (made of particles with mixed microstructure) of a portion of alumina that displayed the required HP properties could not be predicted simply on the basis of the initial HP properties of one of the two starting alumina used.

3.3.8 The Board notes, however, that claim 10 does not necessarily require that the catalytic materials made of two alumina of different porosity must have undergone calcination. Neither does claim 10 require the claimed catalytic material to be prepared starting from a mixture of the two alumina. Also the whole patent description, including "*Example 2*", does not even indirectly suggest that the catalytic material containing both HP and e.g. a L/MP alumina may be or had been prepared forming a mixture of the two alumina prior to impregnation. In particular, even the passages in "*Example 2*" explicitly mentioning a "*mixture*" of alumina only refer to the already prepared catalytic materials, and not to a combination of the starting alumina ingredients as such.

Hence, the Board finds convincing the argument of the Appellant that the person skilled in the art (in particular if fearing that the calcination of a mixture of alumina particulates could actually result in particles having mixed microstructures) would rather consider the other self-evident possibility for preparing "calcined" variants of the catalytic materials according to claim 10, i.e. that of mixing two catalytic materials, each previously separately prepared only using one of the two alumina (i.e. either the HP alumina or the L/MP alumina). In other words, a skilled person would consider self-evident the possibility of reproducing the subject-matter of claim 10 by separately impregnating each of the two alumina with the Pt-component, followed by separate drying and, when required or desired, also by calcination and/or milling, and only thereafter mixing the two separately prepared catalytic materials.

3.3.9 Summarizing, the Board comes to the conclusion that the disclosure in the patent in suit enables the skilled person to carry out many embodiments of the patented invention, including embodiments similar to those disclosed in the patent examples and/or identified as preferred in the patent in suit, by:

- impregnating with a solution of the Pt-component and drying an alumina whose porosity properties are already as required in claim 1 and, if needed,
- carrying out some "simulations" on the HP alumina *per se,* of (any of or all) the further processing steps that are feared to possibly substantially alter the HP properties of the starting alumina and modifying the preparations process accordingly, and/or selecting other available alumina as starting ingredients.

Thus, the porosity measurements required for carrying out many embodiments of the invention are just those needed for determining the porosity properties of a porous alumina *per se*, i.e. just the conventional methods that are routinely used for measuring the porosity of porous materials.

3.4 Argument (iii)

3.4.1 Nevertheless, the Respondent objected that the mere existence of several conventional methods that were (in its opinion) all equally suitable for measuring the HP properties, rendered the disclosure provided in the patent in suit insufficient (argument "(iii)" at 3.1 above).

3.4.2 The Board finds, however, that even assuming, for the sake of an argument in favour of the Respondent, that two or more conventional measuring methods appeared to the skilled person equally suitable for determining (some of or all) the three relevant HP properties e.g. in a starting alumina, still the Respondent's objection is not convincing for the following reasons.

The Respondent's line of argument is essentially that (for any HP property) the skilled person using one or the other of the (allegedly) equally suitable measuring methods, could measure on the same material different values for each of the relevant properties. This rendered it impossible, at least in some cases, to establish with certainty that a given starting alumina displays the required HP properties and, thus, also rendered impossible to predict whether the catalytic materials obtainable from such alumina constituted embodiments of the invention or not. Already this uncertainty *per se* justified the conclusion that the patented invention had been insufficiently disclosed.

The Respondent considered this line of reasoning to be in accordance with the jurisprudence in the decision T 464/05 of 14 Mai 2007 (Reasons 3.3.3 to 3.3.5) dealing with a case in which the absence of information in the application regarding the method for measuring a crucial parameter implied substantial differences in the measured values obtainable when using one or the other of the possible measuring methods. The consequential impossibility of establishing with certainty whether certain objects were or not embodiments of the invention was considered to be objectionable under Article 100 b) / 83 EPC.

3.4.3 The Board notes however, that this approach has not been followed in a number of more recent decisions, such as e.g. the decisions T 608/07 of 27 April 2009 and T 482/09 of 14 July 2011. In particular, in T 608/07 (Reasons, 2.5.2) it has been concluded that an objection of insufficiency of disclosure is only justified when the discrepancy in the measured values is of such magnitude "permeate[s] the whole claim" and hence "deprive[s] the skilled person of the promise of the invention". In T 482/09 (see Reasons 2.1) it has explicitly been found that when the concerned parameter is a common parameter for which several standard measurement methods are undisputedly known, the fact that a value of a recited parameter is uncertain (due to the fact that different measurement methods may lead to different results) did not amount to an insufficiency of the disclosure, but could impact on other patentability requirements.

3.4.4 The Board follows the rationale of these latter decisions.

Accordingly, the Board notes that in the present case, the person skilled in the art - aiming at identifying an alumina suitable as starting ingredient for preparing the catalytic materials of the invention - is only confronted with the alleged difficulty of carrying out the invention provided the application of at least two among the possible alternative measuring methods to a same given alumina leads to two values for a same porosity property, one of them being within and the other one outside the range indicated in the claim at issue. However, the frequency of such difficulty depends on the extent of the discrepancy between the values obtainable by the two different measuring methods. The smaller their discrepancy, the larger the number of available starting alumina whose porosity properties, when measured with both methods, are in each case as required by claim 1, i.e. the number of embodiments that provide the "promise of the invention" with the required degree of certainty.

Hence, in the absence of proof, or of conclusive technical arguments justifying serious doubts that in the present case the discrepancy between the values obtainable by the different measuring methods was of a magnitude such that the uncertainty would "permeate the whole claimed range", the Board has no reason to doubt that the skilled person is able to carry out a plethora of embodiments of the invention within the ambit of the claim.

3.4.5 The Board notes that there is no evidence on file (actually not even an allegation of the Respondent) possibly indicating that the extent of the discrepancy in the results obtainable when choosing one or the other of the alternative methods is normally of such magnitude as to render it very difficult, if not impossible, to find alumina possessing the required HP properties with certainty.

3.4.6 Accordingly, the Board rejects as unconvincing also the last argument (iii)" (point 3.1, *supra*) of the Respondent submitted in support of its insufficiency objection.

3.5 Hence, the Board concludes that the ground of opposition of Article 100 b) EPC does not prejudice the maintenance of the patent as granted.

4. Novelty

The Respondent's sole novelty attack, based on D1, targets only the catalytic material of claim 1 (not the method of claim 16). In particular, the Respondent only invoked the embodiments that the Opposition Division had found to anticipate the subject-matter of claim 1, i.e. the catalyst compositions exemplified in D1 (page 10, line 63, to page 11, line 11: "Verfahren I zur Herstellung von Katalysatoren zur Abgasreinigung", herein below "Verfahren I").

The catalyst compositions described, such as those labelled Nr. 1 to 7, had the HP properties reported in "Tabelle 1" (on page 10 of D1), and had been obtained by the process labelled "Herstellungsverfahren A für eine Katalysatorzusammensetzung" (see D1 from page 7, line 58 to page 8, line 6).

The Respondent stressed in particular that according to D1 (page 4, lines 38 to 41) the thickness of the layer of catalyst compositions deposited on a carrier was preferably in the range of from 10 to 100 µm. In its opinion, this implied that the catalyst particles forming such layer in accordance with "Verfahren I" of D1 had to have a particle size in the range of from 1 to 100 µm as required by claim 1 at issue.

4.1 As regards the porosity properties of the catalyst compositions 1 to 7 reported in "Tabelle 1" of D1, the Board holds that they are not necessarily (not even roughly) to be equated to the porosity properties of the finer particles of the catalyst compositions.

(i) obtained by milling the catalyst 1 to 7 and then (ii) used to form a layer of catalyst on the carrier, as described under "Verfahren I" (D1, page 11, first paragraph on page 11 of D1).

However, even assuming, for the sake of argument only but in favour of the Respondent, that the finer (milled) particles actually display the porosity properties mentioned in "Tabelle 1", the fact remains that the range of "10 to 100 µm" for the thickness of the catalyst layer on the carrier is merely disclosed in D1 as a preferred rather than a mandatory range. Accordingly, the layers of catalyst formed on the carrier according to the "Verfahren I" exemplified in D1 cannot be presumed to necessarily also have a thickness within that range. Consequently, the milled particles used to form such layers could also have a particle size above 100 µm.

4.2 If only for this reason the Board comes to the conclusion that D1 provides no implicit or explicit, direct and unambiguous disclosure of a particulate catalytic material having, in combination, the specific particle size and comprising an alumina support material with the HP properties required by claim 1.

4.3 Claim 1 is thus not objectionable for lack of novelty over D1 (Articles 52(1) and 54(1)(2) EPC.

5. Inventive step

5.1 The invention relates to catalytic materials for the conversion of hydrocarbons, CO and NO_x contained in gas streams to CO_2, H_2O and N_2 and its use in such a conversion method (paragraph [0001] and claim 16 of the patent in suit).

5.2 Catalytic materials for purifying exhaust gases comprising a Pt-component deposited onto conventional alumina represent the closest prior art. More particularly, the comparative sample described in

Example 1 of the patent suit and making use of alumina "A" undisputedly represents such prior art. Hence, for the Board, this comparative sample is the most appropriate starting point for the assessment of inventive step.

5.3 According to the patent in suit (paragraphs [0001] and [0025]), the technical problem formulated in the patent in suit in the light of the closest prior art consisted in providing catalytic materials with improved conversion performance.

5.4 As a solution to said technical problem, the patent in suit proposes the catalytic materials according to claim 1, which is characterised in particular by its particle size and the HP properties of the alumina support material used.

5.5 The Board accepts that the technical problem posed is indeed effectively solved by the proposed solution, as apparent from the experimental data present in Tables IC and II of the patent.

5.6 Non-obviousness of the solution

5.6.1 According to the patent, the desired improvement of the conversion performance of the oxidation catalyst is obtained by ensuring that the support component onto which the Pt-component is deposited has the HP properties defined in claim 1.

5.6.2 The Respondent alleged that the proposed solution would be obvious to the person skilled in the art because it was self-evident that a more porous catalyst would provide higher conversion performance. Hence, it would be obvious to solve the posed technical problem by replacing the alumina A used as support according to the closest prior art with a more porous alumina such as a HP alumina.

5.6.3 The Respondent did not, however, provide evidence supporting this line of argument. Moreover, the Appellant disputed that it would be evident to the skilled person that an increase in porosity of the support would always necessarily enhance the conversion performance of a catalyst of the type concerned.

5.6.4 Since the Respondent's line of reasoning is based on a disputed allegation not corroborated by supporting evidence, it is disregarded by the Board. As a consequence, the Respondent's line of reasoning (summarised in 5.6.2 *supra)* cannot convince the Board.

5.7 Document D15a

5.7.1 In the discussion of the inventive step objection at the oral proceedings, the Respondent also referred to D15a. The admissibility of this document into the proceedings was, however, disputed by the Appellant.

In particular, the Respondent argued that D15a proved that the use of a specific (allegedly HP) alumina to produce an oxidation catalyst belonged to the prior art.

The Respondent did not, however, dispute the observation of the Appellant that this document does not even indirectly refer to, let alone disclose, the porosity properties of said specific alumina.

If only for this reason, the Board concluded that this document could not possibly corroborate the allegation that a more porous alumina was likely to result in a catalyst with higher conversion performance than those based on conventional alumina. In other words, D15a being *prima facie* manifestly irrelevant for the assessment of inventive step, it was also unnecessary for the Board to decide on the admissibility of D15a into the appeal proceedings.

5.8 The Respondent has thus not succeeded in rendering plausible that the proposed solution to the technical problem was obvious to the skilled person having regard to the state of the art (Articles 52(1) and 56 EPC).

Conclusion

6. None of the grounds of opposition invoked by the Respondent prejudice maintenance of the patent as granted.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is maintained as granted.

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

D. Magliano B. Czech

Decision electronically authenticated