

## Deckblatt Übersetzung

### Daten der Übersetzung:

Court/Gericht:	Bundesgerichtshof
Date of Decision / Datum der Entscheidung:	2019-03-12
Docket Number / Aktenzeichen:	X ZR 34/17
Name of Decision / Name der Entscheidung:	Cer-Zirkonium-Mischoxid II

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# FEDERAL COURT OF JUSTICE

IN THE NAME OF THE PEOPLE

## JUDGMENT

X ZR 34/17

Pronounced on:  
12 March 2019  
Anderer  
Judicial Secretary  
as Clerk of the  
Court Registry

in the patent nullity proceedings

Cer-Zirkonium-Mischoxid II/  
Cer-zirconium mixed oxide II

IntPatÜbkG Art. II Sec. 6(1) sentence 1 no. 2

a) If the patent protection is directed to a substance which, with respect to a certain parameter, reaches or exceeds a minimum value specified in the patent claim, the invention is executably disclosed if a measuring method is available to the skilled person with which he can reliably determine the relevant value.

b) If this requirement is fulfilled, it does not prevent the executability if the skilled person has to resort to general technical knowledge to prepare or carry out the measurement.

Federal Court of Justice, judgment of 12 March 2019 – X ZR 34/17 – Federal Patent Court

ECLI:DE:BGH:2019:120319UXZR34.17.0

The X. Civil Senate of the Federal Court of Justice, following the oral hearing on 12 March 2019, attended by the presiding judge Prof. Dr. Meier-Beck, the judges Gröning, Dr. Bacher and Hoffmann as well as the judges Dr. Kober-Dehm

ruled that:

The appeals against the judgment of the 3rd Senate (Nullity Senate) of the Federal Patent Court of 11 October 2016 are dismissed.

Three quarters of the costs of the appeal shall be borne by the plaintiff and one quarter by the defendant.

By operation of law

Facts of the case:

1           The defendant is the owner of European patent 735 984 (patent in suit), which was filed on 20 December 1994, claiming the priority of a French application of 24 December 1993, and which relates, inter alia, to a composition based on a cerium-zirconium mixed oxide. Patent claim 14, to which fourteen further claims are referred back, reads in the language of the proceeding:

Composition à base d'un oxyde mixte de cérium et de zirconium, caractérisée en ce qu'elle présente un volume poreux total d'au moins 0,6 cm<sup>3</sup>/g et en ce qu'au moins 40%, plus particulièrement au moins 50%, du volume poreux total est apporté par des pores de diamètre d'au plus 1 µm.

2           The plaintiff, who is being sued by the defendant for infringement of the patent in suit, challenged the patent to the extent of claims 14 to 16 and 18 to 25 on the grounds that the invention was not disclosed in such a way that a skilled person could carry it out, and that the subject matter of the patent went beyond the content of the documents originally filed and was not patentable. The defendant defended the patent in suit as granted and, in the alternative, in five amended versions.

3           The Patent Court declared the patent in suit null insofar as its scope extended beyond the version defended by the first-instance auxiliary request 1, and dismissed the action in all other respects.

4           Both parties have appealed against this decision. The plaintiff continues to seek a complete declaration of nullity to the extent stated above. The defendant is seeking complete dismissal of the action and is filing five supplementary auxiliary motions, which are largely the same as the first-instance motions but are being asserted in a different order.

Grounds of the decision:

5 Both appeals are admissible but unfounded.

6 A. The patent in suit relates, insofar as is of interest in the dispute, to a composition based on a cerium-zirconium mixed oxide.

7 I. According to the statements in the patent in suit, cerium and zirconium oxide were known in the state of the art as suitable components of catalysts, in particular also of three-way catalysts for the decomposition of carbon monoxide, hydrocarbons and nitrogen oxides in the exhaust gas of internal combustion engines. There were many indications that the combined use of both substances would be particularly advantageous. Various attempts had been made to use mixed oxides. This requires a material with the largest possible surface area and high temperature resistance. To obtain such mixed oxides, calcination or annealing at more than 1000°C is necessary. Because of this high temperature, the specific surface area would not be above 10 m<sup>2</sup>/g, and generally even below 5 m<sup>2</sup>/g.

8 Against this background, the patent in suit concerns the technical problem of providing a mixed oxide of cerium and zirconium with high temperature resistance and large surface area.

9 II. To solve this problem, the patent in suit proposes, in claim 14, a composition whose characteristics can be divided as follows:

1. the composition is based on a cerium-zirconium mixed oxide.
2. the total pore volume is at least 0.6 cm<sup>3</sup>/g.
3. at least 40% of the total pore volume is formed by pores with a diameter of 1 µm or less.

10 III. The Patent Court substantiated its decision essentially as follows:

11 According to the granted version, the invention protected by patent claim 14 was not disclosed in such a way that a skilled person, a chemist with a doctorate and experience in the development of exhaust gas catalysts, could

carry it out. With the minimum specification for the total pore volume, a theoretically infinite range is claimed. This range had sub-ranges for which the feasibility was neither comprehensibly demonstrated nor at least appeared plausible.

12           The subject matter defended by the first-instance auxiliary claim 1, which provides for an upper limit of 1.5 cm<sup>3</sup>/g for the total pore volume, was, on the other hand, disclosed in an exportable manner.

13           The total pore volume in the sense of the patent in suit is the sum of the volume of all pores present on the surface. In this context, all voids between individual particles must also be taken into account, because the patent in suit does not distinguish between individual types of pores. The deviating understanding derived by the plaintiff from the measurement results of an expert opinion (K21) jointly commissioned by the parties and two private expert opinions (K22a, K22b) obtained by the plaintiff finds no basis in the patent specification. From the porograms reproduced in the patent in suit it could not be derived exactly in which areas different pore volumes were located. The comparison made by the plaintiff with porograms for other samples did not lead to a different assessment.

14           The patent in suit shows the skilled person how to determine the relevant porosity properties. The plaintiff had not provided any evidence that the mercury intrusion porometry cited in the patent in suit was unsuitable for these purposes. Its argument that the measuring device mentioned in the patent in suit is no longer commercially available does not lead to a different assessment, because it is part of the daily practice of the skilled person to make measurements carried out with different measuring devices comparable by comparing the parameters used. The exact specification of all parameters used in the measurement is unnecessary, because the skilled person knows which parameters are important and how they are to be adjusted. The fact that preliminary tests may be necessary for this does not lead to a different assessment. Furthermore, it was not necessary to specify whether the measurement was to be carried out continuously or step by step.

15           Contrary to the plaintiff's opinion, the measurements are also reproducible if the volume of the cavities between individual particles is included. It was known to the skilled person that the reaction volume could depend on the sample preparation. However, he could determine the extent of the resulting variations and take them into account in the respective final results.

16           The invention protected by patent claims 20 to 22 was also disclosed in an executable manner. The range specification provided therein, according to which the material must have a specific surface area of at least 20 or 40 m<sup>2</sup>/g, was sufficiently limited by the specifications on the total pore volume in the referenced patent claim 14. Contrary to the plaintiff's view, the specific surface area can be determined with the BET method stated in the patent in suit. The skilled person had no doubts that this method was applicable to all catalysts, irrespective of the assignment to one of the total of six possible isothermal types. The objection that the method could only provide theoretical values was irrelevant because a comparison of different surfaces was also possible on this basis.

17           The subject matter defended by the first-instance auxiliary request 1 was new. The European patent application 605 274 (K6) did not contain any information on the total pore volume and the pore distribution. It could not be inferred beyond doubt from the reports on reworking submitted by the plaintiff (K7 and K8) whether the products obtained were the mixed oxides disclosed in K6. The same applies to the publication by Einarsdóttir (Production of Zirconia (12 mol% CeO<sub>2</sub>) Powder by Supercritical Drying and its Properties, British Ceramic Proceedings 1991, 55-60, K9) and the international application WO 89/08611 (K11). The reports on reworking submitted for these (K10 and K24; K12) indicated deviating process steps. Contrary to the plaintiff's view, these deviations cannot be considered insignificant.

18           The subject matter defended with the first-instance auxiliary request 1 was also based on inventive step. US patent 4,713,233 (K13) discloses, among other things, a mixed oxide of aluminum and zirconium. However, there were no indications for exchanging aluminum for cerium. Furthermore, the measured values given in K13 for the zirconium mixed oxides doped with yttrium or

aluminum did not suggest a total volume in the range envisaged in patent claim 14. Further suggestions would also not result from K9 or K11.

19           B.     This assessment stands up to review in the appeal proceedings.

20           I.     The Patent Court correctly came to the conclusion that the invention claimed in the granted version of the attacked patent claims is not disclosed in such a way that a skilled person can carry it out.

21           1.     According to the case law of the Senate, in the case of a feature claimed in a generalized form, it is not generally necessary for the patent specification to show the skilled person a feasible way to realize it for every conceivable embodiment.

22           If, for example, a "generically" claimed process step, when considered in its general meaning, belongs to the problem solution according to the invention, it is sufficient in principle if a specific embodiment is disclosed in an executable form. The situation may be different, however, if an open area is defined by two mutually opposing parameters without the barriers resulting from the interaction of the parameters being disclosed. Then the proposition claims validity that the possible patent protection is limited by the contribution to the state of the art. In such cases, the executable disclosure covers only those areas in which the executability results from the disclosed measures or those measures that are common to the skilled person working subsequently, or in which it is at least plausible, in particular in the case of selective disclosures (Federal Court of Justice, judgment of 25 February 2010 - Xa ZR 100/05, BGHZ 184, 300 = GRUR 2010, 414 marginal no. 23 - Thermoplastic composition).

23           The assessment of this question always requires an evaluative consideration. The degree of generalization that is permissible in this context depends in each individual case on whether the protection afforded by the respective version of the claim is within the scope of what can be inferred from the patent from the point of view of a skilled person, taking into account the description and the embodiment examples contained therein, as the most general form of the technical teaching by which the problem underlying the invention is solved (Federal Court of Justice, judgment of 11 September 2013 -

X ZB 8/12, BGHZ 198, 205 = GRUR 2013, 1210 marginal no. 21 - Dipeptidyl peptidase inhibitors; judgment of 17 January 2017 - X ZR 11/15, GRUR 2017, 493 marginal no. 36 - Borreliosis assay).

24           2.       In the case in dispute, an executable disclosure is therefore lacking for the range of values of the total pore volume claimed with feature 2.

25           a)       Contrary to the statements of the Patent Court, which may be misleading in individual respects, this does not, however, already result from the fact that the claimed range is open on one side and therefore theoretically extends into infinity.

26           A range of values limited only in one direction can be disclosed in an executable manner according to the principles outlined above, if the invention is not exhausted in the opening of a certain range, but shows a generalizable teaching going beyond it, which for the first time enables the skilled person to look for further possibilities of improvement and to exceed the maximum value specifically shown in the patent.

27           b)       Contrary to the view of the defendant, however, a unilaterally open range is not already exhaustibly disclosed if the claimed range is determined by two or more parameters which are opposed in their effects and for this reason alone set limits to a further improvement with regard to all advantages sought.

28           On the contrary, the principles outlined are generally applicable if the claim is directed to a non-limited field, but the patent shows an executable way to achieve the desired goal only for a limited field. In all these constellations, the contribution of the claimed teaching to the state of the art is decisive.

29           c)       The patent in suit does not show any generalizable teaching in the above sense. Contrary to the defendant's view, it did not provide a new class of mixed oxides with particularly favorable properties with respect to total volume and size distribution of the pores, but merely a new process by which mixed oxides with improved properties can be produced.

30           As is also stated in the description of the patent in suit, cerium-zirconium mixed oxides were known in the state of the art as a particularly suitable starting

material for catalysts and were available with pore sizes which were in principle suitable for this purpose, albeit capable of improvement. In this respect, the protected invention did not open up a completely new path for the skilled person, but merely indicated a process route by which the overall pore size and thus the suitability of the material for use in catalysts can be increased. A subsequent invention which enables a further improvement independently of this manufacturing process is thus not based on the contribution which the patent in suit has made to the state of the art. Therefore, in the required evaluative consideration, only that area which can be achieved with the disclosed process is to be regarded as disclosed in an executable manner.

31           3.       With regard to the second-instance auxiliary requests 1 to 3, which essentially correspond to the first-instance auxiliary requests 3, 4 and 2, nothing else applies.

32           a)       According to the second-instance auxiliary request 1, the granted version of patent claim 14 is to be supplemented to the effect that the composition is obtainable by calcination at a temperature of between 200°C and 1000°C. This is not a practicable way either.

33           This, too, does not indicate any feasible way of fulfilling the requirement claimed in feature 2.

34           According to the explanations in the patent specification, calcination is not the means by which the desired large pore volume is achieved, but rather a process step which tends to reduce the pore volume. Consequently, the additionally claimed feature concerns a parameter that tends to have an opposite effect with respect to the desired objective. Such a feature does not provide the skilled person with any additional assistance with regard to the question of how he can further increase the total pore volume beyond the limits apparent from the patent in suit.

35           b)       According to the second-instance auxiliary request 2, the granted version of patent claim 14 is to be supplemented to the effect that the composition is in the form of a solid solution.

36 This also does not indicate a way in which the total pore volume can be further increased beyond the range disclosed as executable.

37 c) According to the second-instance auxiliary request 3, the granted version of patent claim 14 is to be supplemented to the effect that the composition has a specific surface area of at least 20 m<sup>2</sup>/g after calcination at 800°C for six hours.

38 This adds a further open area to the open area disclosed in feature 2, which is not practicable, without providing the skilled person with additional means to increase the total pore volume.

39 II. The Patent Court was also correct in considering the claim to be unfounded insofar as it is directed against the version defended at first instance by auxiliary claim 1 and at second instance by auxiliary claim 4, according to which the total pore volume is in the range of 0.6 cm<sup>3</sup>/g to 1.5 cm<sup>3</sup>/g.

40 1. The Patent Court correctly decided that, when determining the total pore volume within the meaning of feature 2, not only the cavities within individual solid particles, designated as intraparticle volume, are to be taken into account, but also, where appropriate, the spaces between individual particles, designated as interparticle and reaction volume.

41 a) The Patent Court was correct in not attributing any solely decisive importance to the general scientific usage of language asserted by the plaintiff with reference to the submitted private expert opinions (K22a, K22b).

42 According to the plaintiff's submissions, pores are considered in the relevant literature to be cavities or channels in a solid that are connected to the surface and whose depth is greater than their width. For powdery materials consisting of a large number of small solid particles with more or less large interstices, the plaintiff wants to draw the conclusion from this that only voids within the individual particles are to be regarded as pores, while the empty spaces between the particles are to be regarded as "intergranular voids".

43 Whether this conclusion is consistent with general scientific usage can be left undecided. Even if the question were to be answered in the affirmative,

it would not follow from this or from other circumstances that this understanding also underlies the patent in suit.

44           b)     The Patent Court also correctly inferred from the content of the patent specification to be used for the interpretation that empty spaces between individual particles are to be included in the consideration.

45           aa)    The description of the patent in suit distinguishes between a first embodiment with a total pore volume of at least 0.6 cm<sup>3</sup>/g, in particular at least 0.7 cm<sup>3</sup>/g (p. 5 lines 12-15), which can be achieved by drying under atomization (p. 5 lines 40, séchage par atomisation), and a second embodiment with a total pore volume of at least 0.3 cm<sup>3</sup>/g (p. 3 lines 18-21), which is generally obtained by drying in an oven without comminution or disagglomeration (p. 5 lines 34 f., séchage en étuve sans broyage ou désagglomération). In the first embodiment, voids between the individual particles are to be expected due to the comminution.

46           bb)    The mercury porosimetry (p. 5 lines 25-32) stated as a measuring method in the description of the patent in suit basically also covers such cavities.

47           This method measures the total amount of mercury that can be introduced into the sample to be examined by applying pressure. The porogram used to represent the measurement result can be used to determine the relationship between the amount of mercury absorbed and the size of the absorbing pores, because the measurement is made at increasing pressure and the mercury penetrates into smaller and smaller cavities as the pressure increases. This makes it possible to distinguish between certain types of cavities, provided that their size differs sufficiently clearly.

48           In the interpretation, it must also be taken into account that loosely arranged material is initially compressed by the externally supplied mercury in a first phase of the measurement until the individual particles touch each other. What proportion of the total mercury supplied is accounted for by this so-called compaction volume can only be reliably determined if the size of the gaps remaining after the compaction can be determined with sufficient accuracy. Alternatively, an attempt can be made to compact the material prior to

measurement in such a way that as little as possible of the reaction volume remains.

49           cc)    The description of the patent in suit does not deal with these aspects.

50           The porograms reproduced in Figures 1 and 2 for embodiments 2 and 3, in which the material obtained was deagglomerated in a mortar after drying and before calcination (p. 7 lines 28-31), and for the state of the art comparative examples 4 and 5 (p. 7 lines 55-57) do not indicate any differentiation between different types of voids.

Fig. 1

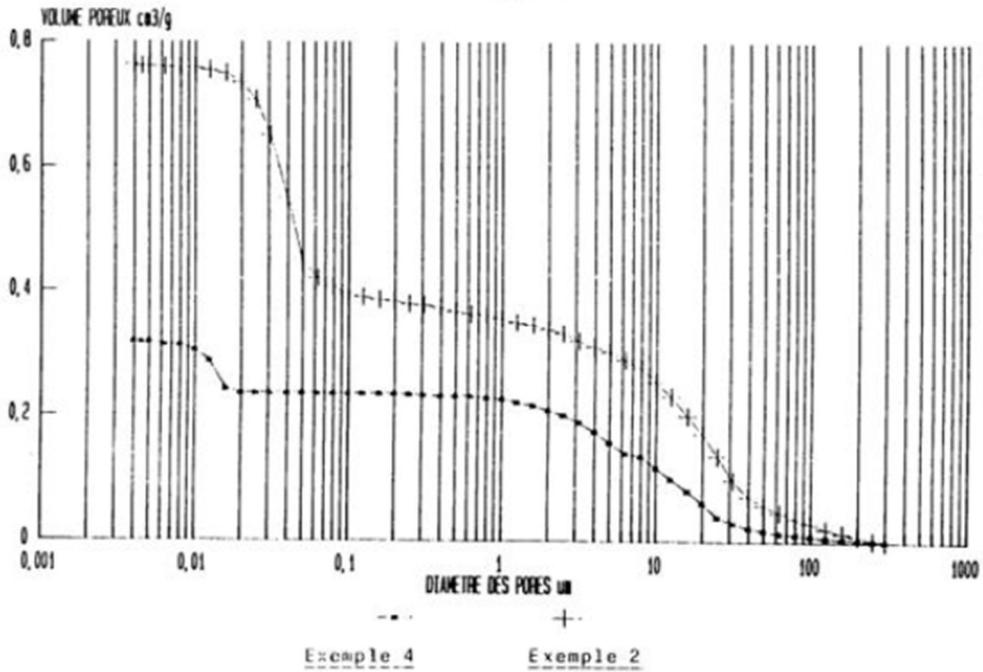
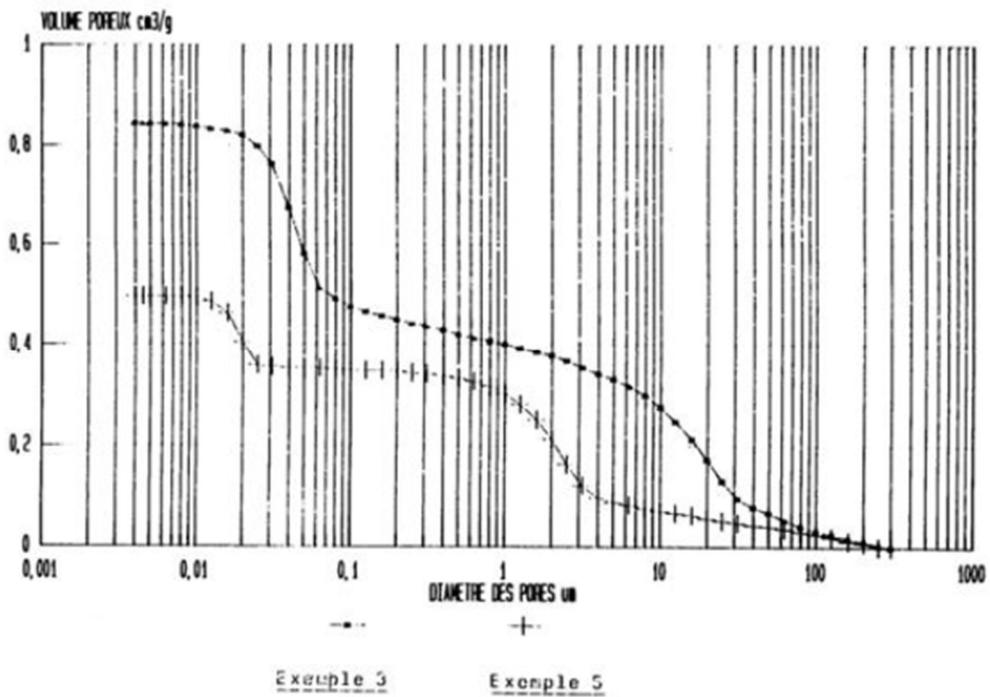


Fig. 2



51 There is no indication in the description of the patent in suit that the reaction volume or the interparticle volume remaining after the first compaction phase was subtracted from the measured values determined. The minimum value of 0.6 cm<sup>3</sup>/g given in the description is indeed lower than the total volume of about 0.8 cm<sup>3</sup>/g shown in the figures. However, neither the figures nor the description indicate that this difference is based on such a deduction and which

criteria, if any, were used to distinguish the individual types of voids from each other.

52           dd)    Moreover, insofar as the course of the curves shown allows any interpretation at all, the description tends to suggest that the minimum value of 0.6 cm<sup>3</sup>/g given comprises the interparticle volume.

53           In the opinion of the plaintiff, the intraparticle and interparticle volumes in Figures 1 and 2 can be distinguished on the basis of the two areas in which the curve rises significantly. If this were true, only about half of the total value of around 0.8 cm<sup>3</sup>/g would be accounted for by the intraparticle volume. The stated minimum value could therefore only be achieved by including the interparticle volume.

54           There are no indications in the description that the patent in suit intends to distinguish between interparticle and reaction volume. In particular, it is not mentioned there that the material was compacted again after comminution and before measurement.

55           ee)    From a functional point of view, no deviating assessment results.

56           However, the compaction volume is not necessarily meaningful for the suitability of the material as a catalyst if the material is formed into beads in the course of further processing, as described in the description (p. 6 line 31 f.), and compaction occurs in the course of this processing.

57           However, this processing step is only given as an example. In contrast, a comminution of the material prior to calcination is particularly emphasized as a possibility to increase the total pore volume.

58           Against this background, it can in any case not be ruled out that an additional volume achieved by loosening the material increases the fundamental attractiveness of the material for use in catalysts. From this point of view, too, it would seem inconsistent to make deductions from the pore volume determined.

59           2.    The Patent Court also correctly decided that the invention is disclosed in such a way that a skilled person can carry it out.

60           a)     The executability is not precluded by the fact that the reaction volume included in the measured value may depend on the way in which the sample is prepared.

61           According to the findings of the Patent Court, the skilled person is aware of the influence that the preparation of the sample can have on the reaction volume. He can determine the extent of such variations by series of measurements and obtain reproducible results by establishing standardized methods. From this, the Patent Court correctly deduced that the skilled person can determine the total pore volume within the meaning of feature 2 on the basis of his technical knowledge.

62           Contrary to the plaintiff's view, the approach pointed out by the Patent Court does not lead to arbitrary or random results. The standardization of the sample preparation, which is necessary and possible according to the findings of the Patent Court, is not aimed at determining a certain measured value as binding at will within the possible range of variation, but at reducing disturbing influences emanating from the sample preparation to a minimum, i.e. avoiding both compaction and additional loosening of the material to be examined as far as possible. Contrary to the plaintiff's opinion, this does not require that there is a generally valid procedure for the preparation of samples. Rather, it is sufficient if the skilled person is able to determine a method that meets the aforementioned requirements in relation to a specific material in an individual case. The latter is possible according to the findings of the Patent Court.

63           b)     Furthermore, the fact that not all parameters for the measurement are specified in detail in the patent in suit does not prevent practicability.

64           According to the findings of the Patent Court, the skilled person knows which parameters are important for the measurement and how they are to be set. The Patent Court rightly considered this to be sufficient.

65           Contrary to the opinion of the plaintiff, the lack of further specifications, for example on the question whether the pressure is increased gradually or continuously during the measurement, does not lead to random or arbitrary measurement results in this context either. On the contrary, it follows from the

findings of the Patent Court that the skilled person can judge which measurement results are to be regarded as reliable. Thus, a large part of the existing adjustment possibilities serves the purpose of ensuring that, as far as possible, all existing cavities are filled with mercury. Accordingly, it is the aim of the specialist to set these parameters in such a way that the measured value is as high as possible. Certain settings, on the other hand, can lead to the material to be examined being damaged, resulting in additional cavities. With regard to these parameters, the aim is consequently to achieve the lowest possible measured values.

66           c)     The Patent Court rightly considered the invention protected by claims 20 to 22, which is additionally characterized by concrete requirements for the specific surface of the material, as also being disclosed as executable.

67           aa)    The measurement method according to the ASTM D 3663-78 standard cited in the description of the patent in suit (p. 3 lines 41-43), which is based on the procedure first proposed by Brunauer, Emmet and Teller (BET) in 1938, is, according to the findings of the Patent Court, suitable in principle for all isotherm types and is used in the art irrespective of knowledge of the isotherm type.

68           With its appeal argument, the plaintiff does not show any concrete evidence that would cast doubt on the completeness or correctness of these findings.

69           The plaintiff essentially repeats its first-instance submission, according to which it is stated in the introductory remarks of the said standard (K3 p. 1140 under 1.1) that the method is used to determine the specific surface area of catalysts with a type II or IV adsorption isotherm, which the substances at issue in the dispute do not have according to a private expert opinion (K5). The Patent Court considered this objection to be unfounded in its assessment of the facts, because the skilled person applies the measuring method for all isotherm types, notwithstanding the cited reference, which is proven, inter alia, by the international application WO 89/08611 (K11 p. 17 lines 10 f.). These findings are not called into question by the plaintiff's insistence on its differing position.

70           bb) The fact, emphasized by the plaintiff, that the BET method provides too low measured values for certain types of isotherms because the nitrogen atoms used to determine the surface do not penetrate into every pore does not prevent the suitability of this method for the purpose envisaged in the patent in suit.

71           The patent in suit is concerned with achieving the greatest possible specific surface area. In order to be able to verify the achievement of this goal, a measuring method is required which provides sufficient certainty that the surface area actually present is not smaller than the measured value indicates. This requirement is also met by the BET method in the constellations in question here. The possibility, which cannot be ruled out, that the surface actually present even exceeds the measured value does not constitute a practically relevant disadvantage for the intended use presupposed by the patent in suit.

72           cc) Contrary to the opinion of the plaintiff, the fact that the BET method or the standard ASTM D 3663-78 are not explicitly mentioned in the patent claims 20 to 22 does not prevent the practicability.

73           From the fact that the patent claims do not refer to a specific measuring method, it may follow that not necessarily the method mentioned in the description has to be used. However, especially if several methods are considered which lead to fundamentally different results, the information in the description is of decisive importance in order to substantiate the specifications in the patent claims which are not sufficient in themselves. In the present context, this does not necessarily mean that only a measurement according to the ASTM D 3663-78 standard can be considered. However, another method may only be used if it can be expected to give essentially the same results.

74           3. The Patent Court rightly considered the protected subject matter as new.

75           According to the findings of the Patent Court, the methods described in the experimental reports of 16 April 2013 (K10) and 13 July 2016 (K24) do not correspond in all respects to the method disclosed in K9. This stands up to scrutiny in the appeal proceedings.

76           a)     The question of which compositions the skilled person would have obtained before the priority date by identical or obvious reworkings of the example disclosed in K9 can only be assessed in the dispute on the basis of circumstantial evidence.

77           Direct evidence would only be possible if there were indications that it had already been possible before the priority date to obtain a composition in accordance with the patent by such reworkings. Such indications are neither presented nor otherwise evident.

78           The test results presented by the plaintiff are unsuitable for direct evidence because the documented tests took place after the priority date. Particularly in view of the considerable time lag to the priority date in 1993, the results of these tests can only constitute an indication that essentially the same results would have been obtained before the priority date.

79           b)     In accordance with the general principles of civil procedural law, circumstantial evidence can only be regarded as having been established if the court is convinced that the circumstantial facts presented are correct and that they allow the conclusion to be drawn with the certainty required under Sec. 286 Code of Civil Procedure that the main fact put in evidence is correct. Before taking evidence, the trial judge may and must therefore examine whether the circumstantial evidence is conclusive, i.e. whether the totality of all the circumstantial evidence presented - assuming it is correct - would convince him of the truth of the main fact (Federal Court of Justice, judgment of 25 October 2012 - I ZR 167/11, NJW-RR 2013, 743 marginal no. 26; judgment of 8 May 2012 - XI ZR 262/10, BGHZ 193, 159 marginal no. 45).

80           These principles are also relevant for patent revocation proceedings.

81           Unlike in civil proceedings, the principle of official investigation applies in patent revocation proceedings. In the present context, however, this principle can only lead to the fact that the court may also have to take into account circumstantial facts in its assessment, which have not been submitted by any party, provided that other circumstances give rise to corresponding indications. The assessment as to whether the submitted and other circumstantial facts in

their entirety lead to the conclusion that the main fact is correct, on the other hand, must be carried out in the same manner.

82           c)       Therefore, the Patent Court correctly addressed the question whether the circumstantial evidence pointed out by the plaintiff is sufficient to support the conclusion postulated by the plaintiff. With its objections raised against the assessment of the Patent Court, the plaintiff does not show any concrete indications that give rise to doubts about the completeness or correctness of the findings made. Such indications are also not otherwise apparent.

83           It can be left open what consequences it has that in the tests described in K10 and K24 a Büchner filter was used instead of the filter press mentioned in K9. The judicial assessment of the Patent Court, according to which the informative value of the documented tests is not sufficient to regard the conclusion postulated by the plaintiff as proven beyond doubt, is already supported by the considerations regarding the products obtained and the temperature/pressure profile. Therefore, it is not objectionable that the Patent Court refrained from taking evidence on the circumstantial facts presented by the plaintiff.

84           aa)       According to the findings of the Patent Court, the deviations with regard to the specific surface after calcination at different temperatures, which are evident from the test reports, give rise to doubts as to whether the documented tests were carried out as would have been obvious to the skilled person before the priority date.

85           The objections raised by the plaintiff that it is possible that the values disclosed in K9 are based on measurement errors, and that the measurement of the specific surface is always associated with inaccuracies, are not capable of calling this assessment into question. Concrete indications that the Patent Court overlooked this possibility are not apparent. The fact that it did not consider it sufficient to consider the circumstantial evidence to be established does not cast doubt on the correctness of the finding made.

86           bb) According to the findings of the Patent Court, the differences in the temperature/pressure profile evident from the test reports also give rise to doubts about the validity of the documented tests.

87           This assessment is not called into question by the circumstance cited by the plaintiff that the temperature profile depends on the heat transfer characteristics of the reactor or autoclave used.

88           The Patent Court drew the conclusion from the fact that K9 contains specific information about at which temperature which pressure is reached that this profile can be of decisive importance for the product obtained. On this basis, it saw a decisive difference in the fact that in the process described in K9 a pressure of 130 bar is reached only at a temperature of 272°C, whereas this pressure occurred in the tests described in K24 already at 243°C and 235°C, respectively. The plaintiff does not show any evidence which could suggest that, contrary to the assessment of the Patent Court, these differences cannot be of significance. 4.

89           4.       The Patent Court also correctly decided that the protected subject matter is based on inventive step.

90           a)       The protected subject matter is not suggested by K9.

91           aa)     K9 discloses a process for preparing a powder of zirconia doped with 12 mole percent ceria suitable for further processing into ceramic material.

92           In the introduction to K9, it is stated that in known processes, hard agglomerates are formed during calcination, which lead to problems in the sintering required for the production of ceramics. To prevent the formation of agglomerates as far as possible, it is suggested that a solution of zirconium and cerium hydroxide be subjected to supercritical drying. A powder produced in this way has a relatively large specific surface area of 34 m<sup>2</sup>/g after calcination at 1000°C and, by sintering at a temperature of 1300°C, achieves a density of more than 98% of the theoretical maximum value.

93           bb) From this, there was no suggestion for the skilled person to use the process disclosed in K9 to obtain a cerium-zirconium mixed oxide with a high total pore volume.

94           The relatively large specific surface area described in K9 can theoretically be based on a large pore volume. However, the explanations in K9 do not deal with this aspect. There, the focus is rather on the avoidance of agglomerates. In this context, a large specific surface area is an indicator for a low degree of agglomerate formation. In contrast, the formation of pores for the use as a starting material for a sintering process, which is the focus of K9, is at most of secondary importance according to the defendant's uncontradicted submission.

95           In view of this, there was no sufficient reason for the skilled person to consider the process disclosed in K9 as a possible starting point for achieving a larger total pore volume.

96           cc) Contrary to the plaintiff's view, the protected subject matter is also not suggested because the tests documented in K24 provided a mixed oxide with the claimed features.

97           According to the case law of the Senate, however, an object is to be regarded as obvious which the skilled person inevitably obtains when he uses a process suggested by the state of the art (Federal Court of Justice, judgment of 24 July 2012 - X ZR 126/09, GRUR 2012, 1130 marginal no. 29 - Leflunomid). Neither K24 nor the other test reports in connection with K9 can be inferred, however, that a reworking of the process disclosed there necessarily leads to a mixed oxide with the properties claimed by the patent in suit.

98           It can be left open whether and to what extent the differences between the process disclosed in K9 and the process documented in K24 can be influenced by the skilled person or are based on accidental properties of the apparatus used. Insofar as the skilled person can influence these differences, there are no indications from K9 as to how this must be done in order to achieve the total pore volume provided for in feature 2 and the distribution provided for in feature 3. Insofar as the differences are based on coincidences, there is no guarantee that the properties claimed by the patent in suit will necessarily result.

99           b)     The protected subject matter is also not suggested by US patent specification 4 713 233 (K13).

100          aa)    K13 deals with the preparation of inorganic hydrated oxides.

101           In the introduction it is stated that the pore volume and the specific surface area of such oxides could be increased by using organic solvents for the preparation of the gels or solutions when conventional apparatuses for spray drying are used (Sp. 2 lines 36-40). Example 6 of the embodiment describes the preparation of zirconium oxide (Sp. 9 Z. 52 ff.), Example 9 describes the preparation of an yttrium-zirconium mixed oxide (Sp. 10 Z. 34 ff.), and Example 15 describes the preparation of an aluminum-zirconium mixed oxide (Sp. 12 Z. 30 ff.).

102           In Table 1, the specific surface area and pore volume, respectively after spray drying and after calcination (800°C for Examples 6 and 9, 700°C for Example 10, 900°C for Example 15), are given as follows:

Beispiel	Spezifische Oberfläche		Porenvolumen	
	Getrocknet	Kalziniert	Getrocknet	Kalziniert
6 Zr	242 m <sup>2</sup> /g	19 m <sup>2</sup> /g	1,65 cm <sup>3</sup> /g	0,74 cm <sup>3</sup> /g
9 Y/Zr	185 m <sup>2</sup> /g	8,8 m <sup>2</sup> /g	0,75 cm <sup>3</sup> /g	0,31 cm <sup>3</sup> /g
10 Y/Zr	181 m <sup>2</sup> /g	40 m <sup>2</sup> /g	0,18 cm <sup>3</sup> /g	0,13 cm <sup>3</sup> /g
15 Al/Zr	479 m <sup>2</sup> /g	301 m <sup>2</sup> /g	1,4 cm <sup>3</sup> /g	1,1 cm <sup>3</sup> /g

103          bb)    This did not provide sufficient indications for the skilled person that a cerium-zirconium mixed oxide with characteristics 2 and 3 could be obtained by one of the routes disclosed in K13.

104           It is true that the results listed in Table 1 demonstrate that a pore volume of more than 0.6 cm<sup>3</sup>/g is achievable with certain starting materials and certain process routes. However, the different values obtained for the individual examples of K13 did not justify a reasonable prospect that the use of cerium instead of aluminum or yttrium would lead to the desired minimum value. In view of the different results, it was also not readily apparent by which specific process design the result could be influenced in the desired direction.

105            Contrary to the plaintiff's view, a comparison of examples 6, 9 and 10 does not give rise to any further suggestions. It can be left open whether these examples indicate that a large specific surface area and a large pore volume cannot be achieved with zirconium oxide or with zirconium mixed oxides at the same time. Irrespective of how this question is to be answered, there is in any case no indication that doping with cerium produces better results in this respect.

106            The fact that mixed oxides based on cerium and zirconium were known in the state of the art to be fundamentally advantageous does not lead to a different assessment. Despite these advantages, there was no mixed oxide with features 2 and 3 in the state of the art.

107            C.     The decision on costs results from Sec. 121(2) Patent Act as well as Sec. 97(1) and Sec. 92(1) Code of Civil Procedure.

Meier-Beck

Gröning

Bacher

Hoffmann

Kober-Dehm

Previous instances:

Federal Patent Court, judgment of 11 October 2016 – 3 Ni 5/15 (EP) –