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D E C I S I O N
of 5 April 1995

Case Number: T 0626/91 - 3.3.2

Application Number: 85200972.9

Publication Number: 0167201

IPC: B01J 23/74

Language of the proceedings: EN

Title of invention:

Nickel/alumina/silicate catalyst, its preparation and use

Patentee:

UNILEVER N.V., et al

Opponent:

SÜD-CHEMIE AG
HOECHST AG
Engelhard De Meern B.V.

Headword:

Catalyst/UNILEVER

Relevant legal provisions:

EPC Art. 83, 84

Keyword:

"Parameter without definition of its method of determination in the patent"

"No generally known and reliable method available"

Decisions cited:

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Catchword:

-



Case Number: T 0626/91 - 3.3.2

D E C I S I O N
of the Technical Board of Appeal 3.3.2
of 5 April 1995

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Decision under appeal: Interlocutory decision of the Opposition Division
of the European Patent Office dated 22 February
1991 posted on 26 July 1991 concerning maintenance
of European patent No. 0 167 201 in amended form.

Composition of the Board:

Chairman: P. A. M. Lançon
Members: M. M. Eberhard
S. C. Perryman

Summary of Facts and Submissions

- I. European patent No. 0 167 201 based on application No. 85 200 972.9 was granted on the basis of 15 claims.
- II. The Respondents I and III (Opponents 1 and 3) and the Opponent 2 filed Notices of Opposition requesting the revocation of the patent on the grounds of lack of novelty and/or lack of inventive step and insufficiency of disclosure (Art. 100(a) and Art. 100(b) EPC). The Notice of Opposition of Opponent 2 was rejected as inadmissible on the basis of Rule 56(1) EPC by a decision dated 14 August 1989 against which no appeal was lodged.

In its Notice of Opposition, Respondent III relied inter alia upon the public prior use of a catalyst having the product code Ni-5136P, lot 376, and filed i.a. a declaration of Mr D. V. Okonek and a sales copy of Harshaw Filtrol Partnership to Akzo Chemie America in support of the alleged public prior use.

The citations and declarations referred to by the Opponents and the Patentees during the opposition procedure were not relied upon at the appeal stage except for the following documents:

- (3) J. W. E. Coenen and al, Proc. 3rd Int. Congr. Catalysis, Vol. II, Amsterdam 1965, pages 1387 to 1399,
- (4) J. W. E. Coenen and B. G. Linsen, Physical and Chemical Aspects of Adsorbents and Catalysts, Acad. Press (1970), pages 472 to 527.

The Appellants (Patentees) submitted three sets of amended claims as main request, first auxiliary request and second auxiliary request at the oral proceedings before the Opposition Division on 22 February 1991. Claim 1 of the main request reads as follows:

"1. A nickel/alumina/silicate catalyst with the following combination of features:

- 1) an atomic nickel/aluminium ratio of 5 to 20;
- 2) an atomic nickel/silicon ratio of 4.5 to 20;
- 3) an active nickel surface area of between 70 and 150 m²/g nickel;
- 4) an average pore size of 4 to 20 nm;
- 5) an open porous structure of macropores and mesopores, the mesopores having an average pore size of 8 to 20 nm; and
- 6) nickel crystallites having an average diameter between 1 and 5 nanometers."

III. By an interlocutory decision the Opposition Division decided to maintain the patent in the amended form according to the second auxiliary request submitted on 22 February 1991. The Opposition Division held that the catalyst Ni-5136P, lot 376, of the Harshaw Filtrol Partnership was made available to the public before the priority date and that the sample analysed by Mr Okonek was identical to said catalyst even if the latter was sold and delivered in the passivated form. According to the decision the catalyst of Claim 1 of the main request comprised a feature which was formally new over the Harshaw catalyst, namely the average pore size of the mesopores, however this feature could neither be used for limiting the scope of Claim 1 nor for distinguishing the claimed catalyst from the prior art catalysts because it was unclear. The range of 8 to 20 nm did not clearly define the mesopore structure actually present in the catalyst since the patent in suit did not

indicate the method for determining this parameter and there existed no valid method for said determination. It was concluded that Claim 1 of the main request was not allowable in the meaning of Article 84 EPC. The Opposition Division considered that the defect of unclarity remained valid with regard to Claim 1 of the first auxiliary request because the average pore size of the mesopores was an important parameter of the catalyst which determined its catalytic properties.

IV. The Appellants lodged an appeal against this decision insofar as it concerned the main and the first auxiliary requests. Together with the Statement of Grounds of Appeal they filed four sets of amended claims as first, second, third and fourth auxiliary requests on 18 November 1991.

Claim 10 of the first auxiliary request differs from Claim 1 of the main request only in that the words "as obtainable by a process according to Claim 1 and/or Claims 1 to 9" have been added after the feature 6).

Claim 1 of the second auxiliary request is identical to Claim 1 of the main request except for the additional sentence "for use as a catalyst in the hydrogenation of unsaturated fats and oils", which has been incorporated after the feature 6).

Claim 1 of the third auxiliary request differs from Claim 1 of the main request only by the limitation of the range of the active nickel area which now reads "between 90 and 150 m²/g nickel".

Claim 1 of the fourth auxiliary request corresponds to Claim 1 of the main request except for the deletion of the feature (5) relating to the porous structure.

In the course of the appeal procedure the Appellants further submitted a declaration of Dr W. T. Koetsier and four documents which were referred to in said declaration, as well as the three following documents:

- G1 Sales brochure of Quantachrome, New York, "The leader in Powder Technology",
- G2 Newsletter, Quantachrome, New York, New methods for Micropore Characterization,
- G3 The Microreport, August 1990, Vol. 1, No. 2, pages 1 to 4.

Respondent III provided the complete IUPAC recommendations of 1984 mentioned in the declaration of Dr W. T. Koetsier and published in Pure & Appl., Vol. 57, No. 4, pages 603 to 619, April 1985.

Oral proceedings were held on 5 April 1995.

- V. In connection with the prior use, the Appellants contested that the Ni-5136P catalyst was made available to the public before the priority date.

As regards the method for determining the average pore size of the mesopores, the Appellants contended that there was no apparent reason to suppose that the catalysts of the invention, which were obtainable by a precipitation process including the in-situ formation of the support, would have pores with a form other than the slit shape obtained with the co-precipitation process of (4). In case of any doubt as to the pore model to be used in determining the average pore size, it would have been easy to repeat the examples of the patent in suit and to determine the total pore volume of the catalysts thus obtained and their surface area. As the BET surface area and the average pore size were disclosed in the patent in suit for each example, it would have been

clear at once which pore model would have to be used to establish the scope of protection of Claim 1. The Appellants further argued in their written submissions that G1 to G3 showed apparatus which could be used in micropore analysis and that according to G3 the effective micropore size could be calculated. Therefore, there existed methods for determining the micropore surface area as well as the micropore pore volume so that the surface area of the mesopores could be determined contrary to the Respondents' allegations. At the oral proceedings the Appellants did not dispute that the BET method enabled the determination of the total surface area of the pores and that it was not possible to attribute the surface area to the mesopores or to the micropores. In the case where both micropores and mesopores were present the surface area of the mesopores alone could not be determined.

The Appellants further contended that Article 84 EPC could not be used as a legal basis for refusing the main request since the objection based upon Article 84 did not arise out of amendments to the feature deemed to be vague and indefinite. Reference was made to the decision T 301/87 in this respect.

VI. Respondent III disputed the Appellants' arguments as regards the non-availability of the prior use to the public.

In connection with the average pore size of the mesopores, Respondent III contested that co-precipitates generally had a slit-shaped pore structure. At the oral proceedings Respondent III did not dispute any more that the pore volume of the mesopores could be determined provided that the shape of the pores be given. It was argued that the surface area of both the micropores and the mesopores was measured by the BET method and that

there existed no method to determine the surface area of the mesopores alone. Therefore, the average pore size of the mesopores could not be calculated and the patent in suit did not fulfil the requirement of sufficiency of disclosure. As regards the use of Article 84 EPC as legal basis for the decision, the Respondent contended that the result of the Opposition Division's findings was a lack of novelty of Claim 1 and that the arguments in T 241/89 applied to the present case.

Respondent III further contended that Claim 1 of the fourth auxiliary request did not meet the requirement of Article 123(3) taking into account that the feature "an open porous structure of mesopores and macropores" was deleted.

- VII. The Appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of Claims 1 to 14 according to the main request submitted during the oral proceedings on 22 February 1991, alternatively on the basis of one of the four auxiliary requests submitted on 18 November 1991. The Respondents requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.
2. The amended claims of the main request, first, second and third auxiliary requests meet the requirements of Article 123(2) and (3) EPC.

3. *Main request*

3.1 As regards the Appellants' arguments in connection with the legal basis of the decision under appeal it is observed that according to the jurisprudence of the Boards an objection under Article 84 EPC cannot in principle be a proper basis for the revocation of a patent if this objection does not arise out of the amendments made to the claims (cf. decisions T 301/87, OJ EPO 1990, 335; T 472/88 EPOR 1991, 487). However, objections to lack of clarity under Article 84 are relevant to opposition proceedings insofar as they can influence the decisions on issues under Article 100 EPC, for example novelty or inventive step. In such cases these objections need not be investigated further than is necessary to enable assessment of the issues already at hand (cf. decision T 127/85, OJ OEB 1989, 271 and T 525/90 unpublished). In the present case Claim 1 of the main request differs from the granted Claim 1 only in that feature 6) has been added. Feature 5), i.e. the average pore size range of 8 to 20 nm for the mesopores, which is considered in the decision under appeal as unclear, was not amended during the opposition procedure and the question whether or not this feature fulfils the requirements of clarity of Article 84 EPC does not arise out of the addition of feature 6) into the claim. Therefore, Article 84 EPC could not in principle form a proper basis for the refusal of Claim 1 of the main request. However, it appears from the reasons given in the decision that the clarity objection to the range of the average mesopore size was investigated in connection with the novelty issue. The Opposition Division first examined whether the catalyst Ni-5136P of the alleged public prior use had been made available to the public and then it compared the catalyst of Claim 1 with said prior use catalyst. As the average size of the mesopores (feature 5)) was found to constitute the sole possible

distinguishing feature over the known prior use catalyst, or in other words the sole possible new feature, the clarity and the meaning of said feature were examined. The Opposition Division came to the conclusion that feature 5) was meaningless and could neither be used for limiting the scope of Claim 1 nor for distinguishing the claimed catalysts from the prior art catalysts. It implicitly follows from this reasoning that the catalyst according to Claim 1 was considered as lacking novelty over the catalyst Ni-5136P. In these circumstances the Board considers that the novelty issue has implicitly been decided upon and thus that the decision as regards the main request is not only based upon Article 84 but also implicitly upon Article 54 EPC.

3.2 Sufficiency of disclosure.

The patent in suit does not contain any definition of the terms "micropores" and "mesopores". However the IUPAC recommendations of 1984, which illustrate the common general knowledge shortly before the filing date of the patent application, disclose that in the context of physisorption, pores with widths not exceeding 2 nm and pores of widths between 2 nm and 50 nm are called micropores and mesopores respectively.

According to the features 4) and 5) of Claim 1, the catalyst has an average pore size of 4 to 20 nm and an open porous structure of macropores and mesopores, the mesopores having an average pore size of 8 to 20 nm. The latter feature appears to be compatible with the lower area of the range 4 to 20 nm for feature 4) only if the catalyst contains a non-negligible proportion of micropores.

As pointed out in the decision under appeal and by the Respondents, the patent in suit does not give any information as to how the average pore size of the mesopores, i.e. parameter 5) of Claim 1, was determined. Thus, the question arises whether there existed at the filing date of the patent application a well-known and reliable method for determining the average pore size of the mesopores in a catalyst comprising mesopores and a non-negligible proportion of micropores.

It was not disputed at the oral proceedings that it was common general knowledge that the average pore size of mesopores can be calculated from the pore volume of the mesopores and from their surface area assuming a certain model for the shape of the pores, i.e. generally cylindrical or slit-shaped pores, (see the corresponding formulae given at page 615 of the IUPAC recommendations of 1984 for these two pore models). However, the Respondent's expert and the Appellants' expert agreed at the oral proceedings before the Board that, in the case of a catalyst comprising both mesopores and micropores, it was not possible to derive from the BET surface area what proportion of the surface area could be attributed to the micropores and what to the mesopores.

Furthermore, the Appellants did not indicate any well-known and reliable method which would have enabled the determination of the surface area of the mesopores in a catalyst comprising both mesopores and a non-negligible proportion of micropores. In these circumstances the Board follows the Respondent's arguments that such a method was not available at the filing date.

Consequently, even if the appropriate pore model might have been established by the skilled person, the average pore size of the mesopores could not have been calculated from one of the known formulae referred to above. If certain assumptions were made in order to enable the determination of the average pore size of the

mesopores when micropores are also present in a non-negligible proportion, then these assumptions should have been disclosed in the patent in suit.

In most of the examples of the patent in suit the average pore size of the catalysts lies within the lower region of the claimed range 4 to 20 nm, which implies that the proportion of micropores in these embodiments cannot be very small taking into account that according to feature 5) of Claim 1 the average pore size of the mesopores is between 8 to 20 nm and the catalyst contains macropores. However, these examples neither disclose the specific value of the average size of the mesopores for the exemplified catalysts nor the surface area of the mesopores nor the pore size distribution. In these circumstances even a repetition of these embodiments would not have allowed the skilled person to find out how feature 5) was determined.

The additional documents G1 to G3 submitted by the Appellants cannot be taken into consideration for assessing the sufficiency of disclosure since G1 was published more than five years after the filing date of the patent application and the Appellants could not indicate the date of publication of G2 and G3. The remaining documents relied upon at the appeal stage do not disclose the missing information for the determination of the average pore size of the mesopores.

Therefore, in the absence of any disclosure in the patent in suit indicating how the average pore size of the mesopores is determined when the average pore size lies within the lower region of the range 4 to 20 nm (i.e. when the presence of a non-negligible proportion of micropores is compulsory) and in view of the inability of the skilled person's common general knowledge to cure this deficiency, the disclosure of the

patent in suit is considered to be insufficient for the corresponding subject-matter of Claim 1. Thus, the main request must be refused on the ground of insufficiency of disclosure set out in Article 100(b) EPC.

4. *First and second auxiliary requests*

Claim 10 of the first auxiliary request and Claim 1 of the second auxiliary request define the claimed catalyst by the same combination of parameters 1) to 6) as Claim 1 of the main request. The addition of the sentence "as obtainable by a process according to Claim 1 and/or Claims 1 to 9" in Claim 10 of the first auxiliary request or the mention of the use in Claim 1 of the second auxiliary request has no influence upon the remaining parameters in particular upon the ranges 4 to 20 nm and 8 to 20 nm for the features 4) and 5). Therefore the preceding finding that the patent in suit does not contain sufficient information to allow a skilled person, using the common general knowledge, to carry out the invention within the whole area that is claimed, apply likewise to Claim 10 and Claim 1 of the first and second auxiliary requests.

5. *Third auxiliary request*

Claim 1 of this request is identical to Claim 1 of the main request except for the limitation of the active nickel area to the range 90 to 150 m²/g. This limitation does not cure the deficiency indicated in point 3.2 above. Therefore this request is also refused on the same ground as the main request.

6. *Fourth auxiliary request*

Claim 1 of this request differs from Claim 1 of the main request in that feature 5) of the latter has been deleted. This amendment is not in conformity with the requirements of Article 123(3) for the following reasons. Claim 1 as granted was directed to a nickel/alumina/silicate catalyst having the features 1) to 4) recited in Claim 1 of the fourth request and feature 5) according to which the catalyst has "an open structure of macropores and mesopores, the mesopores having an average pore size of 8 to 20 nm". From the deletion of feature 5) it follows that the present Claim 1 also encompasses catalysts which do not necessarily exhibit an open porous structure of macropores and mesopores. Therefore, the scope of protection of Claim 1 has been extended with respect to that of Claim 1 as granted. Thus Claim 1 of the fourth auxiliary request contravenes Article 123(3) EPC and this request must also be refused.

7. In view of the preceding findings it was not necessary to examine the prior ^{use}~~art~~ issue.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

P. Martorana

P. A. M. Lançon



Case Number: T 0626/91 - 3.3.2

D E C I S I O N of 19 September 1995
correcting errors in the decision
of the Technical Board of Appeal 3.3.2
of 5 April 1995

Appellant: UNILEVER N.V.
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Representative: Smulders, Theodorus A.H.J., Ir.
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Decision under appeal: Interlocutory decision of the Opposition Division
of the European Patent Office dated 22 February
1991 posted on 26 July 1991 concerning maintenance
of European patent No. 0 167 201 in amended form.

Composition of the Board:

Chairman: P. A. M. Lançon
Members: M. M. Eberhard
S. C. Perryman

In application of Rule 89 EPC the decision given on
5 April 1995 is hereby corrected as follows:

Page 12, line 21: "art" is replaced by "use"

The Registrar:



P. Martorana

The Chairman:



P. A. M. Lançon