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D E C I S I O N
of 2 June 2005

Case Number: T 0426/01 - 3.3.7

Application Number: 92117832.3

Publication Number: 0543157

IPC: C10G 45/08

Language of the proceedings: EN

Title of invention:

Catalyst composition, method of preparing same and process for hydrodesulfurizing sulfur-containing hydrocarbons by using the catalyst composition

Patentee:

IDEMITSU KOSAN COMPANY LIMITED, et al

Opponent:

Akzo Nobel N.V.

Headword:

-

Relevant legal provisions:

EPC Art. 54, 111(1)

Keyword:

"Main, first and second auxiliary request: Novelty (no)"
"Third auxiliary request: remittal"

Decisions cited:

-

Catchword:

-



Case Number: T 0426/01 - 3.3.7

D E C I S I O N
of the Technical Board of Appeal 3.3.7
of 2 June 2005

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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 5 February 2001
revoking European patent No. 0543157 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: R. E. Teschemacher
Members: P. A. Gryczka
G. Santavicca

Summary of Facts and Submissions

I. The mention of the grant of European patent No. 0 543 157 in respect of European patent application No. 92117832.3, filed on 19 October 1992, was published on 10 July 1996. Claim 1 of the granted patent read as follows:

"1. A calcined catalyst composition comprising (a) a Group VIA metal of the Periodic Table, (b) a Group VIII metal of the Periodic Table and (c) an alumina, the Group VIA metal and the Group VIII metal being present in a combined amount of 20 to 70% by weight based on the total of the Group VIA metal, the Group VIII metal and the alumina, as calculated on the basis that the Group VIA metal and the Group VIII metal are stable oxides thereof, and the alumina is Al_2O_3 , the catalyst being characterized in that:

(i) the calcination is carried out in an atmosphere of an oxygen-containing gas at 400 to 700°C for 1 to 10 hours,

(ii) the Group VIA metal and the Group VIII are in metallic form, oxide form or compound oxide forms,

(iii) by an X-ray diffraction pattern having no diffraction peak other than a diffraction peak of the alumina, and

(iv) in case the calcination is carried out at 550°C for 3 hours, being characterized by a TPR spectrum from a temperature-programmed reduction of the air-calcined catalyst in a stream of hydrogen, which stream of hydrogen is made by flowing a gas mixture of 65% by volume of hydrogen and 35% by volume of argon gas at a uniform flow rate of 20 ml/min, with a temperature being elevated from 25°C to above 1000°C at a rate of

10°C/min, wherein the TPR spectrum results in a ratio L/H of 0.1 to 0.45, wherein L is the area of a low temperature reduction peak within a temperature range of from not lower than 25°C to lower than 500°C and H is the area of a high temperature reduction peak within a temperature range of from 500°C to 1000°C, with the proviso that when the low temperature reduction peak is not completely separated from the high temperature reduction peak, the areas L and H are calculated by separating the low temperature reduction peak and the high temperature reduction peak from each other at a temperature exhibiting the least consumption of hydrogen."

- II. A notice of opposition was received on 9 April 1997 in which revocation of the patent was requested on the grounds of lack of novelty and inventive step (Article 100(a) EPC).

The following documents were cited, *inter alia*, during the opposition proceedings:

D1: US-A-4 102 821

D2: US-A-4 179 410

- III. The decision under appeal, dated 5 February 2001, was based on a main request filed on 15 September 1997 and an auxiliary request submitted during the oral proceedings before the Opposition Division.

Claim 1 of the main request corresponded to claim 1 as granted.

In claim 1 of the auxiliary request the expression "as defined in (i) above" was added in feature (iv) after the word "calcination".

Claim 5 of both requests read as follows:

"5. A method of preparing the catalyst composition as claimed in any of the claims 1 to 4, comprising kneading an alumina gel with an aqueous solution containing a compound of a Group VIA metal and a compound of a Group VIII metal dissolved therein, in the presence of an aliphatic oxy acid, drying the kneaded product and calcining the dried product in an atmosphere of an oxygen-containing gas at 400 to 700°C for 1 to 10 hours."

In its decision the opposition division held that:

- (a) Claim 1 defined a catalyst composition by the structural and process features (i) to (iv). Feature (iv) had to be interpreted as an optional feature which was relevant and restrictive only if the specific calcination conditions, i.e. 550°C for 3 hours, were applied. Therefore, claim 1 in its broad interpretation did not include any restriction to the TPR spectrum for catalysts obtained by calcination conditions deviating from those indicated in feature (iv).
- (b) D2, which represented the closest prior art, disclosed a calcined alumina catalyst composition comprising cobalt and molybdenum in high concentration, i.e. within the range 20 to 30% by weight of molybdenum oxide and 4 to 12% by weight

of cobalt oxide. The catalyst was calcined at 482 to 677°C (900 to 1250°F) in air, preferably in circulating air. It was emphasized in D2 that the formation of X-ray detectable crystallites of cobalt molybdate must be avoided. Consequently, D2 disclosed all features of claim 1, except feature (iv). However, as the calcination of the catalyst according to D2 was not restricted to the conditions of feature (iv), this feature had not to be considered for assessing novelty having regard to D2. Consequently, the catalyst composition according to claim 1 lacked novelty over D2.

(c) The same reasons applied to claim 1 of the auxiliary request, as the added feature only made clear that the calcination step in feature (iv) was the same as that of feature (i), which was anyhow understood in that manner by the parties.

IV. On 12 April 2001, the Proprietor (Appellant) lodged an appeal against the above decision, the appeal fee being paid on the same day. The statement setting out the grounds of appeal was received on 11 June 2001. With a letter dated 27 April 2005, the Appellant filed 3 sets of claims as the main, the first and the second auxiliary requests, the main request corresponding to the main request underlying the impugned decision, apart from the correction of a clerical error.

In claim 1 of the first auxiliary request the expression "characterized in that" was replaced by the expression "characterized by all of the following

features (i) to (iv)" before the enumeration of features (i) to (iv).

In claim 1 of the second auxiliary request the expression "said catalyst composition fulfilling the requirements (i) to (iii) is furthermore characterized" was added between feature (iii) and feature (iv) and the expression "being characterized" was deleted in feature (iv).

V. Oral proceedings took place on 2 June 2005. The Appellant filed a set of amended claims 1 to 4 as third auxiliary request. The sole independent claim of said request reads as follows:

"1. A method of preparing a calcined catalyst composition comprising (a) a Group VIA metal of the Periodic Table, (b) a Group VIII metal of the Periodic Table and (c) an alumina, the Group VIA metal and the Group VIII metal being present in a combined amount of 20 to 70% by weight based on the total of the Group VIA metal, the Group VIII metal and the alumina, as calculated on the basis that the Group VIA metal and the Group VIII metal are stable oxides thereof, and the alumina is Al_2O_3 , the catalyst being characterized in that:

(i) the calcination is carried out in an atmosphere of an oxygen-containing gas at 400 to 700°C for 1 to 10 hours,

(ii) the Group VIA metal and the Group VIII are in metallic form, oxide form or compound oxide forms,

(iii) by an X-ray diffraction pattern having no diffraction peak other than a diffraction peak of the alumina, and

(iv) in case the calcination is carried out at 550°C for 3 hours, being characterized by a TPR spectrum from a temperature-programmed reduction of the air-calcined catalyst in a stream of hydrogen, which stream of hydrogen is made by flowing a gas mixture of 65% by volume of hydrogen and 35% by volume of argon gas at a uniform flow rate of 20 ml/min, with a temperature being elevated from 25°C to above 1000°C at a rate of 10°C/min, wherein the TPR spectrum results in a ratio L/H of 0.1 to 0.45, wherein L is the area of a low temperature reduction peak within a temperature range of from not lower than 25°C to lower than 500°C and H is the area of a high temperature reduction peak within a temperature range of from 500°C to 1000°C, with the proviso that when the low temperature reduction peak is not completely separated from the high temperature reduction peak, the areas L and H are calculated by separating the low temperature reduction peak and the high temperature reduction peak from each other at a temperature exhibiting the least consumption of hydrogen, comprising kneading an alumina gel with an aqueous solution containing a compound of a Group VIA metal and a compound of a Group VIII metal dissolved therein, in the presence of an aliphatic oxy acid, drying the kneaded product and calcining the dried product in an atmosphere of an oxygen-containing gas at 400 to 700°C for 1 to 10 hours."

VI. The Appellant's arguments can be summarised as follows:

- (a) It was essential for the assessment of novelty with regard to the prior art to establish whether or not feature (iv) in claim 1 was a distinctive

feature. That feature was not an optional feature as held by the Opposition Division, but a functional feature which restricted the claimed composition to those compositions which showed a specific TPR spectrum when a calcination was carried out at 550°C for 3 hours. Feature (iv) did not define the calcination step for obtaining the calcined catalyst, which was the purpose of feature (i), but described the conditions for testing the catalytic composition. This interpretation of claim 1 could be derived from the whole content of the patent-in-suit and from the claims as originally filed. As the Opposition Division had not considered this feature as a distinction over D2, the assessment of novelty was not correct.

- (b) The amendments carried out in claim 1 of the first and second auxiliary requests sought to make even clearer that the claimed calcined catalyst compositions had to fulfil all features (i) to (iv) and that feature (iv) was not optional.

- (c) The third auxiliary request concerned a process for preparing the calcined catalyst compositions. The claimed process was novel over the process disclosed in D2, which did not involve the use of an oxy acid as required by the patent-in-suit, and that of D1 which mentioned a reduction of the moisture content of the precipitated alumina to 13% whereas the presently claimed process required an alumina in form of a hydrogel. The claimed process also involved an inventive step.

VII. The Respondent submitted that:

- (a) It was not contested that feature (iv) was a functional feature but that feature was nevertheless optional in view of the expression "in case". Hence, the TPR requirement mentioned in feature (iv) of claim 1 must be met only if the calcination of the catalyst composition was performed at 550°C for 3 hours. The patent-in-suit did not provide any general statement supporting an interpretation of claim 1 that required that the specific TPR spectrum specified in feature (iv) was applicable to all claimed catalysts. Consequently, since feature (iv) provided no distinction over the catalysts of D2, the subject-matter of claim 1 lacked novelty with regard to that prior art (Article 54 CBE).
- (b) No other interpretation of claim 1 could be made on the basis of the amendments carried out in claim 1 of the first and second auxiliary requests. Therefore, the claimed calcined catalyst composition in accordance with these requests lacked novelty for the same reasons as the main request (Article 54 CBE).
- (c) No formal objection was raised against the claims of the third auxiliary request. However, the process of preparation of the catalyst composition according to claim 1 of the said request lacked novelty and inventive step, in particular with regard to the process disclosed in D1.

VIII. The Appellant requested that the decision under appeal be set aside and that the patent be maintained on the basis of the main request, alternatively on the basis of the first or second auxiliary request, all filed with the letter dated 27 April 2005, or on the basis of the third auxiliary request as submitted during the oral proceedings of 2 June 2005.

The Respondent requested that the appeal be dismissed.

Neither of the parties raised objections against a possible remittal of the case to the first instance department on the basis of the third auxiliary request.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. The calcined catalytic composition in accordance with claim 1 is defined, *inter alia*, by feature (ii) defining the components of the calcined catalyst, by feature (iii) defining the X-Ray diffraction pattern of the calcined catalyst composition and by feature (i) defining the calcination conditions for obtaining the calcined catalyst composition, i.e. "*the calcination is carried out in an atmosphere of an oxygen-containing gas at 400 to 700°C for 1 to 10 hours*". Furthermore, claim 1 stipulates in feature (iv) that the catalyst composition is characterised by a specific TPR spectrum "*in case the calcination is carried out at 550°C for 3 hours*".

The question arising in relation with the wording of claim 1 is whether the TPR spectrum in accordance with feature (iv) is a characteristic of each claimed catalyst composition fulfilling the calcination conditions defined by feature (i) or, whether this TPR spectrum only applies to catalyst compositions obtained when the calcination step is performed at 550°C for 3 hours.

- 2.1 Claim 1 requires that the claimed calcined catalyst composition is obtained by a calcination step carried out in an atmosphere of an oxygen containing gas at 400 to 700°C for 1 to 10 hours (feature (i)). After having defined these calcination conditions, Claim 1 mentions in feature (iv) that "*in case the calcination is carried out at 550°C for 3 hours*" the claimed catalyst composition is characterised by a specific TPR spectrum. By the wording "***in case the calcination is carried out...***" (emphasis added), feature (iv) refers to a calcination step already defined in claim 1, i.e. the calcination described by feature (i). Feature (iv) literally requires that "*in case the calcination is carried out at 550°C for 3 hours*" the calcined composition is characterized by a specific TPR spectrum. From that wording it can only be understood that the TPR requirement defined in feature (iv) applies in case the calcination is carried out at 550°C for 3 hours and consequently that it does not have to be fulfilled in case the calcination defined by feature (i) is not carried out at 550°C for 3 hours.

- 2.2 In accordance with the Appellant's interpretation of claim 1, each claimed calcined catalyst composition had

to fulfil the requirement set out in feature (iv), independently of the temperature at which it was calcined during its process of preparation. Feature (iv) related to a "test procedure" which had to be carried out in order to determine suitable catalyst compositions, which could then be calcined in accordance with feature (i) to produce the claimed calcined catalyst compositions. Thus, claim 1 only encompassed compositions which, if calcined at 550°C for 3 hours, would have a specific TPR spectrum.

According to this interpretation, claim 1 would require two different calcinations, namely a first "test calcination" for a sample at 550°C for 3 hours as defined in feature (iv) and a calcination step during the process of preparation of the catalysts carried out under the conditions defined in feature (i). However, this cannot be derived from the wording of claim 1. From the expression "*in case the calcination is carried out at 550°C for 3 hours*" placed in the claim after the calcination conditions of feature (i), the skilled person reading claim 1 considers feature (iv) as referring to specific calcination conditions more broadly defined by feature (i) and thus, concludes that the requirement of a specific TPR spectrum should be fulfilled only when the catalyst is prepared by a calcination at 550°C for 3 hours.

- 2.3 Claim 1 does not contain any contradiction in this respect and does not call for an interpretation in the light of the description. In any case, the description of the patent in suit does not support the Appellant's interpretation of claim 1.

The description mentions that "*After air calcined at 550°C for three hours, the calcined catalyst composition of the present invention is characterized by a TPR spectrum...*" (page 5, lines 53 to 58). No conclusion in the direction of a "calcination test" can be derived from this passage which in essence does not add more information than claim 1 itself. Furthermore, the calcined catalysts in accordance with the examples of the patent-in-suit were all prepared by a process involving a calcination at 550°C for three hours (page 9, lines 12 and 13). These calcination conditions represent in the examples the conditions for preparing the catalyst, in other words the calcination conditions defined by feature (i) in claim 1. No mention is made of a "test calcination" performed at 550°C for 3 hours, which is followed by a calcination under different conditions for preparing the catalyst composition. The Appellant also referred to the claims of the patent application as originally filed as basis for its interpretation. However, these claims are not present anymore in the patent specification, neither as claims nor as parts of the description and cannot be used to interpret the granted claims (Article 69 EPC).

2.4 The Board arrives therefore at the conclusion that the interpretation of claim 1 made by the first instance department in the contested decision holds true.

2.5 The Appellant did not contest the view that the subject-matter of claim 1, as interpreted by the first instance department, lacked novelty with regard to D2. The Board also sees no reason to deviate from the conclusion set out in the contested decision in this

respect. Consequently, the subject-matter of claim 1 of the main request lacks novelty (Article 54 CBE).

First and second auxiliary requests

3. By amending the wording of claim 1 of the first and second auxiliary requests, the Appellant sought to reflect in the claim that feature (iv) was not optional.

3.1 To that purpose, the Appellant introduced in claim 1 of the first auxiliary request that the catalyst composition is characterized "*by all of the following features (i) to (iv)*". However, in claim 1 of the main request the catalyst composition is also defined by all of the features (i) to (iv), as these features are not presented as alternative features. Furthermore, the fact that all the features (i) to (iv) are required for the claimed catalyst compositions, does not change the optional character of feature (iv) derived from the expression "***in case the calcination is carried out at 550°C for 3 hours...***" (emphasis added). Consequently, the addition of the expression "*by all of the following features (i) to (iv)*" does not modify the situation with regard to the interpretation of claim 1.

3.2 The same considerations apply to claim 1 of the second auxiliary request for which the addition of the expression "*said catalyst composition fulfilling requirements (i) to (iii) is further characterized...*" does not change the fact that feature (iv), by the wording "***in case the calcination is carried out...***" (emphasis added), makes the feature optional as set out above.

3.3 As the amendments in the first and second auxiliary requests do not change the optional nature of feature (iv), the subject-matter of claim 1 of these requests lacks novelty for the same reasons as the main request (point 2).

3.4 In these circumstances, there is no need to examine whether claim 1 of the first and second auxiliary requests is clear (Article 84 EPC).

Third auxiliary request

4. The claims of the third auxiliary request are restricted to a method of preparing calcined catalyst compositions. The patentability of the process as such has not been dealt with in the contested decision. The restriction to a process claim shifts the focus of the relevant issues of the case and, consequently, results in a fresh case. In these circumstances, the Board finds it appropriate to remit the case to the department of first instance in order to give both parties the opportunity of presenting facts and arguments with respect to that new case and enable full consideration of it by the first instance department (Article 111(1) EPC). The parties agreed to that course of action.

5. For the further examination attention is drawn to the following:

The calcination step according to feature (i) is mentioned twice in claim 1 of the third auxiliary request, i.e. in the definition of the catalyst to be prepared and as a step of the claimed process.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance for further prosecution on the basis of the third auxiliary request as submitted during the oral proceedings.

The Registrar:

The Chairman:

C. Eickhoff

R. Teschemacher