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**Datasheet for the decision
of 2 July 2012**

Case Number: T 2438/10 - 3.3.07
Application Number: 01923996.1
Publication Number: 1274506
IPC: B01J 29/06, C10G 49/08
Language of the proceedings: EN

Title of invention:

Catalyst, catalyst support and process for hydrogenation,
hydroisomerization, hydrocracking and/or hydrodesulfurization

Applicant:

BASF Corporation

Headword:

-

Relevant legal provisions:

EPC Art. 54
RPBA Art. 13

Keyword:

"Admissibility of late filed requests - main request (yes),
auxiliary requests (no)"
"Novelty (no)"

Decisions cited:

-

Catchword:

-



Case Number: T 2438/10 - 3.3.07

D E C I S I O N
of the Technical Board of Appeal 3.3.07
of 2 July 2012

Appellant: BASF Corporation
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 5 July 2010
refusing European patent application
No. 01923996.1 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman: J. Riolo
Members: D. Semino
M.-B. Tardo-Dino

Summary of Facts and Submissions

- I. The appeal lies from the decision of the examining division announced at the oral proceedings on 18 May 2010 refusing European patent application No. 01 923 996.1.
- II. The decision was based on a main request and four auxiliary requests, all filed with letter of 26 March 2010. Independent claim 1 according to the main request had the following wording:

"1. Bead shaped catalyst support or catalyst, obtained through a sol-gel method, consisting of up to 5 wt.% binder, 5 to 50 wt.% of at least one molecular sieve material and 50 to 95 wt.% of silica-alumina."

Claim 1 according to the first to third auxiliary requests corresponded to claim 1 of the main request with the addition of the term "non-crystalline" for the silica-alumina (first and third auxiliary request) and of the product-by-process feature "obtainable through addition of an aqueous sol of inorganic salts of aluminum and silicon, containing dispersed therein the molecular sieve material, through an oil-phase to an alkaline water phase" (second and third auxiliary requests).

Claim 1 of the fourth auxiliary request had the following wording:

"1. Bead shaped catalyst for the hydrogenation, hydro-isomerisation, hydrocracking and/or hydrodesulfurisation, of hydrocarbon feedstocks,

obtained through a sol-gel method, consisting of up to 5 wt.% binder, 5 to 50 wt.% of at least one molecular sieve material and 50 to 95 wt.% of silica-alumina, further comprising a catalytically active component selected from precious metals, said catalyst having a dispersion degree of at least 0.2 and said sol-gel method comprising the dropwise addition of an aqueous sol of inorganic salts of aluminium and silicon, containing dispersed therein the molecular sieve material, through an oil-phase to an alkaline water phase."

III. As far as relevant to the present decision, the decision of the examining division can be summarised as follows:

- (a) The product of claim 1 of the main request was not novel over the disclosure of document D1 (GB-A-1 117 210). The disclosure that the catalyst of D1 contained uncombined alumina indicated merely that the alumina was not associated with zeolite, but was part of the matrix, so that there was no reason to give a different meaning to the term silica-alumina used in the application and that used in D1. Moreover, the preparation method disclosed in D1 was clearly a sol-gel method and microspheroidal particles obtained by spray drying as well as granules and pills fell under the term "bead-shaped".
- (b) Also the products of claim 1 according to the auxiliary requests were not novel over D1, because there was no indication whatsoever that would explicitly or implicitly indicate that the silica-

alumina matrix of D1 was crystalline, there was no evidence that the product-by-process features rendered the product different from the one of D1, the dispersion degree was an unusual parameter, which in the absence of evidence could not be considered as a distinguishing feature, and the intended use of the catalyst in D1 was also the hydrocracking of hydrocarbon feedstocks.

IV. The applicant (appellant) filed a notice of appeal against the above decision. With the statement setting out the grounds of appeal, the appellant submitted a document (J. Haber, "Manual on catalyst characterization", Pure & Appl. Chem., Vol. 63, No. 9, pages 1227-1246, referred to as E1 in what follows) and two sets of claims as main and first auxiliary request.

Claim 1 of the main request corresponded to claim 1 of the second auxiliary request on which the decision was based with the specification that the silica-alumina was non-crystalline and acidic and the optional presence of a catalytically active precious metal in an amount of 0.01 to 5 wt.% in the catalyst. Claim 1 of the first auxiliary request corresponded to claim 1 of the fourth auxiliary request on which the decision was based.

At that stage the appellant requested that the decision under appeal be set aside, the appeal fees be refunded and the case be remitted to the first instance for further prosecution in view of substantial procedural violations, or alternatively, that a patent be granted on the basis of the requests which had been filed.

V. In a communication sent in preparation to oral proceedings the Board addressed *inter alia* the issue of novelty and affirmed at the end of the section on novelty that "The appellant has not relied on the feature relating to the dispersion degree to establish a difference between the product of claim 1 and the ones of D1" (point 2.4 of that communication).

VI. With a reply to that communication the appellant filed three sets of claims as new main, first and second auxiliary requests.

Claim 1 of the main request corresponded to claim 1 of the main request filed with the statement of grounds with the deletion of the amount of optional catalytically active precious metal. Claim 1 of the first auxiliary request corresponded to claim 1 of the main request with the addition of a range for the average pore size of the support or catalyst ("higher than 2nm"). Claim 1 of the second auxiliary request contained additionally the specification that the acidic silica-alumina was non-zeolitic and was limited to a bead shaped catalyst (no bead shaped catalyst support was indicated as an alternative).

VII. Oral proceedings were held on 2 July 2012. During the oral proceedings, the appellant abandoned the request for reimbursement of the appeal fee made in the statement of grounds, as well as the request for remittal related to the request of reimbursement, and filed further amended main, first and second auxiliary requests and a third auxiliary request.

Claim 1 according to the main, first and second auxiliary request corresponded to claim 1 according to the main, first and second auxiliary requests filed with the reply to the Board's communication with the further addition that the catalyst support or catalyst had "a dispersion degree of at least 0.2". Claim 1 of the third auxiliary request was directed to a "process for hydrogenation, hydroisomerization, hydrocracking and/or hydrodesulfurization of a sulfur contaminant containing hydrocarbon feedstock" by contact of the feedstock in the presence of hydrogen gas with a catalyst according to claim 1 of the main request, wherein the sulfur contaminant content was from 0.1 to 500 ppm.

In particular claim 1 according to the main request read as follows:

"1. Bead shaped catalyst support or catalyst, obtained through a sol-gel method, having a dispersion degree of at least 0.2 and consisting of up to 5 wt.% binder, 5 to 50 wt.% of at least one molecular sieve material and 50 to 95 wt.% of non-crystalline, acidic silica-alumina, obtainable through addition of an aqueous sol of inorganic salts of aluminium and silicon, containing dispersed therein the molecular sieve material, through an oil-phase to an alkaline water phase, and optionally a catalytically active component selected from precious metals."

VIII. The arguments of the appellant, as far as relevant to the present decision, can be summarised as follows:

- (a) Claim 1 of the main request was amended in order to take into account the suggestion of the Board in the communication sent in preparation to the oral proceedings referring to the dispersion degree.
- (b) Claim 1 of the main request was novel over the products disclosed in D1, as the wording of claim 1 excluded the presence of uncombined alumina and in view of the product-by-process feature of sol-gel production using an oil phase and an alkaline water phase. The presence of free or uncombined alumina in the product of D1 was explicitly mentioned in claim 1 of D1 and derived from the method of production which implied the precipitation of alumina. Moreover, the techniques mentioned in D1, namely grinding, pelletizing, extruding and spray drying, did not lead to a product with the properties and shape of the material of the invention. In particular, spray drying led to a characteristic depression as shown in E1. The claimed beads were also different in size from the particles of D1, which were powder like sprayed droplets. A further differences over D1 was the specific values of the dispersion degree. That parameter was an indication of accessibility of the catalytic sites, was related to the method of preparation and even in the absence of evidence it was reasonable to assume that the accessibility was lower in D1 due to the formation of a less homogeneous composition. Even if it was true that the example in the application did not specify the method of preparation, the method derived explicitly from original claim 23.

(c) In the first and second auxiliary requests a feature with a clear basis in the original description, which was not disclosed in D1, had been added to address the lack of novelty. For that reason, the two requests had to be admitted into the proceedings. Moreover, as the novelty of all product claims had been questioned by the Board, the limitation to a process claim in the third auxiliary request was a legitimate attempt to save the application. Moreover, the process had always been an important part of the application and its analysis required no undue burden, so that also the third auxiliary request had to be admitted into the proceedings.

IX. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request or of first, second or third auxiliary requests, all submitted during the oral proceedings.

Reasons for the Decision

1. The appeal is admissible.

Main request - admissibility

2. The main request, having been filed at the oral proceedings before the Board, was late filed. It differed from the main request filed with the statement of grounds in that claim 1 did not contain the specification of the amount of the optional

catalytically active precious metal and in that it included the feature that the catalyst support or catalyst had "a dispersion degree of at least 0.2".

- 2.1 While the first amendment related to an optional feature and did not therefore change the scope of protection of the claim, the second related to the addition of a product parameter which was relied upon in the analysis of novelty. However, that feature was added according to the appellant in reaction to a suggestion of the Board in the communication sent in preparation to the oral proceedings.

- 2.2 The Board is of the opinion that the passage in the communication of the Board relating to the dispersion degree (see point V, above) was undoubtedly a statement of facts and not a suggestion of an amendment. However, it cannot be excluded that the statement was interpreted in good faith by the appellant beyond its literary meaning as an indication of a possible amendment of the main claim of the application which could lead to a favourable outcome of the case. Moreover, the added feature was already analysed in the appealed decision and it did not raise any new issue which could not be dealt with without adjournment of the oral proceedings (see point 3.3.8, below).

- 2.3 Under such circumstances, the Board finds it appropriate to exercise its discretion (Article 13 of the Rules of Procedure of the Boards of Appeal) by admitting the main request into the proceedings.

Main request - novelty

3. Document D1 discloses a hydrocracking catalyst comprising a silica-alumina-zeolite support, containing from 10 to 40% of uncombined alumina and from 5 to 80% zeolite based on the weight of the support, and, deposited on the support, from 0.1 to 2% by weight of palladium, rhodium, platinum or a mixture thereof (page 1, lines 55-74 and claim 1). The silica-alumina-zeolite support contains from 10 to 40 and preferably from 13 to 35 percent alumina and from 5 to 80 and preferably from 15 to 50 percent zeolite based on the weight of the silica, alumina, and zeolite in the catalyst composite, wherein the zeolite has preferably been introduced into the silica-alumina matrix during its formation (page 2, lines 13-21). No other components of the support or of the catalyst are mentioned in D1.
- 3.1 On the basis of that disclosure it was not contested that D1 discloses a catalyst support and a catalyst, consisting of 5 to 50 wt.% of at least one molecular sieve material (zeolite) and 50 to 95 wt.% of silica-alumina, and optionally a catalytically active component selected from precious metals.
- 3.2 However, the appellant was of the opinion that the claimed product differed from the one of D1 in that it is bead shaped and in that it has improved properties in view of its method of production, in particular it does not contained uncombined alumina, but an homogeneous silica-alumina matrix and has a dispersion degree of at least 0.2.

- 3.3 The Board cannot follow any of the arguments of the appellant for the following reasons.
- 3.3.1 D1 discloses that the catalyst may be in the form of pellets or granules (page 2, lines 74-77) or of microspheroidal spray-dried particles (page 2, lines 89-91). All these forms are roughly spherical, so that catalyst of D1 can be considered as having a bead shape. Moreover, in the absence of any specification of the size of the catalyst or catalyst support in the claim, no size limitation can be inferred by the use of the term "bead shaped" and it cannot be concluded that the particles of D1 are not bead shaped due a different size, as alleged by the appellant.
- 3.3.2 As to the product-by-process features, namely that the catalyst support or catalyst is "obtained through a sol-gel method" and more specifically is "obtainable through addition of an aqueous sol of inorganic salts of aluminium and silicon, containing dispersed therein the molecular sieve material, through an oil-phase to an alkaline water phase", the onus is on the applicant to show that the product obtained by these process steps is different from the product of D1.
- 3.3.3 D1 discloses that a typical procedure for obtaining the catalyst support and catalyst consists in diluting a concentrated sodium silicate solution with water (page 2, lines 23-28), gelling the silica (page 2, lines 28-30), adding an aluminium salt solution to provide the desired aluminium content (page 2, lines 35-45), filtering the silica-alumina slurry after precipitation of the alumina (page 2, lines 56-60) and drying (page 2, lines 63-65), whereby zeolite is added

after gelling the silica (page 2, lines 30-34), after filtration of the slurry (page 2, lines 60-62) or prior to the drying step (page 2, lines 66-68). The dried composite can be ground and sized and then pelletized or extruded, if pellets or granules are desired (page 2, lines 78-82). Spray-drying is instead preferably used for producing catalysts for fluidized beds (page 2, lines 83-91).

3.3.4 There is no doubt that the procedure of D1 is a sol-gel method as indicated in claim 1 of the main request. As to the further specification in claim 1 that the product is obtainable by a dropping-in-oil method, there is no evidence on file that this method would necessarily result in a product which is different from the one of D1. Indeed, there are no comparative examples to show where the difference should lie. On the contrary, not even a product according to the claim is available in the documentation on file, as for the only example of the application as filed (page 13, lines 5-13) an unspecified aqueous sol-gel technique is used (i.e. nothing different from the technique of D1) and no other tests have been filed.

3.3.5 Also the fact that E1 mentions that the shape of spray-dried particles is a sphere with a characteristic depression (page 1232, fourth full paragraph, second sentence) cannot lead to a different conclusion. On one side, there is no definite statement, nor any evidence in E1 that the shape of particles obtained by spray-drying and by dropping-in-oil method are necessarily different and distinguishable. On the other side, not only spray-drying is disclosed in D1 as a possible

method to obtain bead shaped particles (see points 3.3.1 and 3.3.3, above).

- 3.3.6 Under such circumstances it must be concluded that it has not been convincingly shown that there are differences between the products of claim 1 and the products of D1 related to the different methods of production.
- 3.3.7 As a consequence of this, it cannot be acknowledged that the "silica-alumina" obtained in D1, which is disclosed in several instances therein (page 2, lines 57-58, 63, 102, 106; page 3, lines 76, 116; page 4, line 16), differs from the silica-alumina mentioned in the claim. In this respect it is irrelevant that claim 1 of D1 mentions the amount of uncombined alumina as opposed to the zeolite quantity, when it is clear from the whole of the disclosure of D1 (see citations in the previous sentence) that what is obtained is a silica-alumina matrix to which zeolite is added. The formation of a silica-alumina matrix by means of a sol-gel technique both in the application under analysis and in D1 leads also to the conclusion that if a non-crystalline and acidic matrix is obtained in one case (the application), the same should be valid for the other (D1), which inference has not been contested by the appellant.
- 3.3.8 As to the dispersion degree, the appellant did not provide any evidence that the parameter is a usual one in the field, nor that the value of this unusual parameter for a product according to D1 does not fall in the interval mentioned in the claim (at least 0.2). In fact the appellant did not even provide any

information on which values are typical for known catalysts. As also in the case of unusual parameters the onus is on the applicant to show that they constitute a difference with the available prior art and the onus has not been discharged, this feature cannot be acknowledged as a distinguishing one.

- 3.4 For these reasons, the product of claim 1 lacks novelty over the product disclosed in D1.

Auxiliary requests - admissibility

4. First to third auxiliary requests were filed at the oral proceedings before the Board, so that they were undoubtedly late filed.
- 4.1 Both claim 1 of the first auxiliary request and claim 1 of the second auxiliary request included with respect to claim 1 of the main request the specification of a range for the average pore size of the support or catalyst ("higher than 2nm"). Claim 1 of the second auxiliary request contained a few further limitations. Claim 1 of the third auxiliary request was directed instead to a process for reacting a hydrocarbon feedstock in the presence of hydrogen gas by contact with a catalyst according to claim 1 of the main request, wherein the feedstock had a specific content of a sulfur contaminant.
- 4.2 There is no justification for the late filing of those requests, as the deficiency found by the Board for the main request fully confirmed the reasoning and the conclusion of the examining division and no new facts have arisen in appeal.

- 4.3 Both in the first and in the second auxiliary requests a further parameter (the average pore size), whose relevance had never been discussed, was taken from the description and added to independent claim 1, whereby for this parameter no typical values for known catalysts are given, no values for D1 are known and not even a value is available for the only example on file (page 13, lines 5-13 of the application as filed).
- 4.4 In the third auxiliary request claim 1 is limited to a process claim in which a general use of the catalyst (in several reactions of hydrocarbon feedstocks, including hydrocracking) is claimed and the sulfur contaminant content in the feedstock is specified. However, the use is known from D1 (page 1, lines 11-13) and has never been considered as the core of the invention, and the feature relating to the sulfur content has never been discussed in the proceedings and raises the question whether the range given covers the usual amount of sulfur contaminant present in a normal hydrocarbon feedstock.
- 4.5 On this basis the Board does not see any of the auxiliary requests filed at this stage as an appropriate attempt which could overcome the novelty issue and which could be in any case dealt with without delaying the proceedings, and, in the absence of any specific justification for their late filing advanced by the appellant, finds it appropriate to exercise its discretion (Article 13 of the Rules of Procedure of the Boards of Appeal) by not admitting them into the proceedings.

5. As claim 1 of the only request in the proceedings is not novel, there is no reason for the Board to decide on any other issue.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar

The Chairman

S. Fabiani

J. Riolo