**BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS**

**BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE**

**CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS**

**Internal distribution code:**
(A) [ ] Publication in OJ
(B) [ ] To Chairmen and Members
(C) [ ] To Chairmen
(D) [X] No distribution

# Datasheet for the decision of 10 September 2012

**Case Number:** T 0706/08 - 3.3.07

**Application Number:** 02784263.2

**Publication Number:** 1465727

**IPC:** B01J 37/00, B01J 37/04, B01J 29/85

**Language of the proceedings:** EN

**Title of invention:**
Method of making molecular sieve catalyst

**Applicant:**
ExxonMobil Chemical Patents Inc.

**Headword:**
-

**Relevant legal provisions:**
EPC Art. 56

**Keyword:**
"Inventive step - yes"

**Decisions cited:**
-

**Catchword:**
-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

**Case Number:** T 0706/08 - 3.3.07

# D E C I S I O N
**of the Technical Board of Appeal 3.3.07**
**of 10 September 2012**

**Appellant**: (Applicant)
ExxonMobil Chemical Patents Inc.
5200 Bayway Drive
Baytown
TX 77520-2101 (US)

**Representative**:
Mareschal, Anne
ExxonMobil Chemical Europe Inc.
IP Law Shared Services
Hermeslaan 2
BE-1831 Machelen (BE)

**Decision under appeal:**
**Decision of the Examining Division of the European Patent Office posted 27 August 2007 refusing European application No. 02784263.2 pursuant to Article 97(1) EPC 1973.**

**Composition of the Board:**

**Chairman:** J. Riolo
**Members:** D. Semino
P. Schmitz

## Summary of Facts and Submissions

I. The appeal lies from the decision of the examining division dated 27 August 2007 refusing European patent application No. 02 784 263.2. Independent claim 1 of the application as filed read as follows:

"1. A method of making molecular sieve catalyst particles, comprising
a) providing a first dried molecular sieve catalyst;
b) combining the first dried molecular sieve catalyst with water to form a water-catalyst composition;
c) mixing the water-catalyst composition to form a slurry; and
d) drying the slurry to form particles of a second dried molecular sieve catalyst."

The application as filed included in addition independent claims 27 and 28, directed respectively to a calcined molecular sieve catalyst composition and to a method of making an olefin product by contacting a feedstock with a catalyst.

II. The decision was based on a set of 23 claims filed with letter of 21 February 2007, in which the claims directed to a catalyst composition and to a method of making an olefin product had been deleted and claim 1 had been amended as follows:

"1. A method of reworking dried molecular sieve catalyst to form catalyst particles, comprising
a) providing a first dried molecular sieve catalyst made of catalyst particles that contain molecular sieve

particles bound together to form catalyst particles larger than the individual molecular sieve particles;
b) combining the first dried molecular sieve catalyst with water to form a water-catalyst composition, the water-catalyst composition containing no other molecular sieve than that originally present in the first dried molecular sieve catalyst;
c) mixing the water-catalyst composition to form a slurry; and
d) drying the slurry to form particles of a second dried molecular sieve catalyst."

As far as the description was concerned, the decision was based on pages 1 and 3-27 of the original description and pages 2 and 2a filed with letter of 21 February 2007. Those amended pages contained supplementary prior art citations and an added sentence specifying that "According to the invention there is provided a process as defined in any one of the accompanying claims". No other amendment was present.

III. In the appealed decision the following documents were cited:

D1: WO-A-99/21651
D2: EP-A-0 359 841
D3: EP-A-0 359 843
D4: US-A-5 998 329
D5: US-A-3 816 342

IV. The decision of the examining division can be summarised as follows:

Documents D1, D2 and D3 all disclosed in their examples (example I of D1; example 5 of D2; example 1 of D3) a method of making molecular sieve catalyst particles, comprising mixing a molecular sieve with water, followed by spray drying the obtained slurry. In view of the considerations in paragraph [0007] of the application as filed that during manufacture catalyst particles could be made which had undesirable properties, the problem to be solved could be formulated as finding a method that allowed for the catalyst particles to be remanufactured or recycled so as to provide acceptable properties. The skilled person would regard it as a straightforward solution to that problem to re-slurry the molecular sieve catalyst particles with undesirable properties and spray drying the obtained slurry. In particular, the concept of reintroducing catalyst with undesirable properties into the catalyst production process was known from documents D4, which disclosed the recycling of catalyst particle fines to the spray dryer, and D5, which disclosed to recycle particle fines recovered from the spray drying unit, so that the solution proposed in the application could not be considered as involving an inventive step.

In addition, the claimed process differed from the catalyst recycling processes of D4 and D5 in that the water-catalyst composition contained no other molecular sieve than that originally present in the first dried molecular sieve catalyst, whereas in D4 and D5 the recycled particles were mixed with a slurry containing additional molecular sieve. However, since there was no evidence that the distinguishing feature was associated with any technical effect which could support the

presence of an inventive step and D5 disclosed already that the addition of recycle fines improved the hardness of the catalyst particles formed by spray drying, no inventive step was present in the claimed subject-matter.

V. The applicant (appellant) filed a notice of appeal against the above decision. With the statement setting out the grounds of appeal filed on 20 December 2007, the appellant submitted three sets of claims as main, first and second auxiliary requests. The set according to the main request corresponded to the set of claims filed with letter of 21 February 2007, on which the decision had been based. The description amended with letter of 21 February 2007 was left as part of the main request.

VI. The appellant argued essentially as follows:

In the assessment of inventive step the examining division, contrary to established EPO practice, defined the objective problem in isolation from the closest prior art based on the disclosure of paragraph [0007] of the description and in addition expressed the unsubstantiated view that the skilled person would regard it as a straightforward solution to the posed problem to re-slurry the molecular sieve catalyst particles with undesirable properties and spray drying the obtained slurry.

In addition the analysis of inventive step with respect to the disclosure in documents D4 and D5 was based on hindsight. D4 was concerned with adsorbent particles and would therefore not be considered to represent the

closest prior art. Starting from D4, whose disclosure differed from the method of claim 1 of the main request in that D4 did not disclose steps b) and c), the objective problem in view of the effect shown in example 4 of the application was the reduction in particle size of the molecular size catalyst. Neither D5, nor D4 solved that problem in the manner defined in claim 1, which was therefore inventive over the disclosure of those documents. Starting from D5, the objective problem would be the same as with respect to D4 and the same conclusion would be reached.

VII. By means of a telephone conversation on 12 June 2012, the rapporteur informed the appellant that the Board was of the opinion that the claims of the main request filed with the statement of grounds were allowable, but that the description needed further adaptation.

VIII. With letter dated 31 July 2012 the appellant requested remittal of the case to the first instance with the order that a patent be granted on the basis of the claims according to the main request filed on 20 December 2007 and a description still to be adapted to such set of claims.

## Reasons for the Decision

1. The appeal is admissible.

2. The appealed decision was based on a single set of claims which has been maintained by the appellant as the main request in appeal proceedings. The decision

dealt exclusively with the lack of inventive step of the subject-matter of that request.

3. *Closest state of the art*

3.1 The claimed subject-matter concerns a method of reworking dried molecular sieve catalyst to form catalyst particles through reintroduction in the catalyst production process (claim 1 of the main request).

3.2 None of D1, D2 and D3 relates to such a method. D1 concerns a method of making catalysts containing silicoaluminophosphate molecular sieve (claim 1); D2 and D3 relate to a process for converting a feedstock by contacting it with a catalyst which can be a molecular sieve catalyst (claims 1 and 17 of D2; claims 1 and 22 of D3). The examples of these documents mentioned in the decision (example I of D1; example 5 of D2; example 1 of D3) disclose a method of making molecular sieve catalyst particles, comprising mixing a molecular sieve (SAPO-34) with water, followed by spray drying the obtained slurry, but do not address the issue of reworking dried catalyst. None of these documents can be considered as the closest state of the art on this basis alone.

3.3 D4 and D5 both describe the recycle of dried particles to the particle production process (D4: Figure 1 and column 8, line 38 to column 9, line 10, in particular column 9, lines 8-10; D5: column 10, line 61 to column 11, line 21). However, while D4 relates to adsorbent particles (Background of the invention in column 1 and claim 1) and the recycle of dried

particles is sent directly to the spray drier (column 9, lines 8-10), D5 deals explicitly with molecular sieves (column 4, lines 48-61) and the recycle of dried particles is added to a slurry before drying (column 10, line 61 to column 11, line 21).

3.4 In view of this, D5 is to be considered as the closest state of the art for the method of claim 1.

3.5 Document D5 discloses a method for producing fluid catalysts comprising composing a superactive crystalline aluminosilicate component with a relatively inactive matrix component (column 9, lines 25-28), comprising the steps of preparation of the aluminosilicate component (column 9, line 38 to column 10, line 12), including slurrying of the component (column 10, lines 14-18), this component being a molecular sieve (column 4, lines 48-61); preparation of the matrix gel-forming solutions (column 10, lines 19-58), introduction of the slurried aluminosilicate particles into the gel-forming solutions (column 10, line 59 to column 11, line 58), including addition of fines to the hydrogel-forming solutions (column 10, lines 5-21); bead formation including mixing (column 11, line 59 to column 12, line 17) and formation of fluid catalyst particles by spray drying (column 12, lines 18-43). Suitable fines added to the slurry are recycle fines from a spray drying unit (column 11, lines 7-9), which are slurried in water with the crystalline aluminosilicate particles prior to combination with the gel-forming solution (column 11, lines 11-13).

3.6 Considering the processing of the recycle fines from the spray drier, the process can therefore be seen as a method of reworking dried molecular sieve catalyst to form catalyst particles, comprising providing a first dried molecular sieve catalyst made of catalyst particles that contain molecular sieve particles bound together to form catalyst particles larger than the individual molecular sieve particles (the recycle fines resulting from drying a mixture of molecular sieves particles and matrix forming material), combining the first dried molecular sieve catalyst with water (among others) to form a water-catalyst composition and mixing to form a slurry and drying the slurry to form particles of a second dried molecular sieve catalyst. However, the water-catalyst composition contains additional molecular sieve particles since the recycle fines are added to an already formed slurry of aluminosilicate molecular sieve particles.

3.7 The method of claim 1 of the main request differs therefore from the method of D5 in that the water-catalyst composition obtained by combining the first dried molecular sieve catalyst with water contains no other molecular sieve than that originally present in the first dried molecular sieve catalyst.

4. *Problem solved*

4.1 According to the application as filed, its scope is "to find a method that allows for the catalyst particles to be remanufactured or recycled so as to provide properties which are acceptable to the user or manufacturer" since "during the manufacture of molecular sieve catalyst, catalyst particles can be

made which have undesirable properties such as undesirable attrition resistance properties or undesirable particle size properties" (paragraph [0007]).

4.2 This problem is already solved in D5, in which the recycle fines are reinserted in the catalyst production process and are therefore transformed into the desired product.

4.3 While the examples in the application as filed show that the claimed method results in the production of catalyst with desirable properties in terms of attrition resistance and particle size distribution (results for products B2calc, B3calc, C1calc and C2calc in Tables 2 and 3 of the application as filed), they do not offer any comparison with a product made according to the production process of D5, namely one in which the unsatisfactory dried particles are recycled into a slurry containing other molecular sieve particles. Therefore, while the claimed method can be considered as successful in remanufacturing unsatisfactory dried molecular sieve catalyst particles, no improvement with respect to the method of D5 can be acknowledged.

4.4 Under such circumstances, the solved problem, starting from the method of D5, is that of finding an alternative method for remanufacturing or recycling unsatisfactory catalyst particles.

5. *Obviousness*

5.1 None of the documents available on file provides a hint to the proposed solution of the posed problem.

5.2 As outlined above (points 3.2 and 3.3) documents D1, D2 and D3 do not address the issue of reworking already dried catalyst particles and D4 in the context of adsorbent particles mentions only the possibility of recycling fines directly to a spray drier.

5.3 Since the proposed alternative solution of slurrying and drying the unsatisfactory particles without mixing with any other molecular sieve, as simple as it may seem, is not suggested by any of these documents, the presence of an inventive step with respect to the prior art on which the appealed decision was based has to be acknowledged.

5.4 It is noted that no different conclusion could be obtained starting from any of D1 to D4. Taking D1, D2 or D3 as the starting point would in itself result in an *ex-post facto* analysis, since they do not deal with a method of reworking a catalyst (see point 3.2, above). Moreover, no hint could be found in the available prior art to transform the methods of producing a catalyst disclosed therein in a method of reworking a catalyst. D4 does disclose fines recycle, but is further away from the claimed invention than the method of D5 (see point 3.3, above), so that, starting from D4, the skilled person would *a fortiori* come to the same conclusion as above.

6. Therefore, the Board finds that the reasons on which the refusal was based do not hold. Moreover, with the documents available on file, it does not see any other ground which stays against the grant of a patent based on the claims of the main request.

## 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 with the order to grant a patent on the basis of claims 1-23 of the main request filed on 20 December 2007 with the statement setting out the grounds of appeal and a description to be adapted thereto.

The Registrar | The Chairman

S. Fabiani | J. Riolo