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**Datasheet for the decision
of 6 October 2010**

Case Number: T 2160/08 - 3.3.07

Application Number: 05022597.8

Publication Number: 1618945

IPC: B01J 29/064

Language of the proceedings: EN

Title of invention:

Catalyst for purifying an exhaust gas

Applicants:

Toyota Jidosha Kabushiki Kaisha

Headword:

-

Relevant legal provisions:

EPC Art. 76(1), 123(2)

Relevant legal provisions (EPC 1973):

-

Keyword:

"Amendments - added subject-matter as regards parent application as filed (no), as regards divisional application as filed (no)"

Decisions cited:

-

Catchword:

-



Case Number: T 2160/08 - 3.3.07

D E C I S I O N
of the Technical Board of Appeal 3.3.07
of 6 October 2010

Appellants:

Toyota Jidosha Kabushiki Kaisha
1, Toyota-cho
Toyota-shi, Aichi-ken, 471-8571 (JP)

Representative:

Winter, Brandl, Fűrnis, Hübner Röss, Kaiser,
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Decision under appeal:

Decision of the Examining Division of the
European Patent Office posted 29 July 2008
refusing European patent application
No. 05022597.8 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: S. Perryman
Members: B. ter Laan
G. Santavicca

Summary of Facts and Submissions

I. European patent application No. 05 022 597.8, which is a divisional application of European patent application No. 98 941 804.1 having the filing date of 9 September 1998 (hereinafter referred to as parent application), was refused by a decision of the Examining Division of the European Patent Office issued in writing on 29 July 2008.

II. This divisional application as filed comprised two claims, the claims reading as follows:

"1. A catalyst for purifying an exhaust gas including a soluble organic fraction (SOF), the catalyst reducing and purifying nitrogen oxides in an oxygen rich atmosphere which contains oxygen more than necessary for oxidizing components to be oxidized in the exhaust gas by hydrocarbon (HC) adsorbed on a zeolite support, characterized in that the aforementioned zeolite support comprises a first zeolite loaded with at least a catalyst metal selected from the group consisting of Pt, Rh, Pd, Ir and Ag and a second zeolite free from loading a catalyst metal, the molar ratio (Si/Al) of silicon with respect to aluminum of the first zeolite is greater than that of the second zeolite and is 160 or more, said first zeolite is 2/3-1/2 by weight ratio in all zeolites, said first zeolite has pores whose diameters are 5.5 Å or less, and said second zeolite has pores whose diameters exceed 5.5 Å and both the first zeolite and the second zeolite are mixed in a powdered state.

2. The exhaust-gas-purifying catalyst set forth in claim 1 characterized in that said zeolite employs mordenite exhibiting 200 or more, ZSM-5 exhibiting 1,000 or more, type "Y" zeolite exhibiting 400 or more, type "A" zeolite exhibiting 400 or more, ferrierite exhibiting 400 or more, or zeolite β exhibiting 200 or more by a molar ratio (Si/Al)."

III. The parent application as filed comprised nine claims, the claims reading as follows:

"1. A catalyst for purifying an exhaust gas, the catalyst reducing and purifying nitrogen oxides in an oxygen rich atmosphere which contains oxygen more than necessary for oxidizing components to be oxidized in the exhaust gas by hydrocarbon (HC) adsorbed on a zeolite support, wherein:

the exhaust-gas-purifying catalyst is characterized in that said zeolite support comprises a first zeolite loaded with a catalyst metal and a second zeolite free from loading a catalyst metal.

2. The exhaust-gas-purifying catalyst set forth in Claim 1 is characterized in that said first zeolite has pores whose diameters are a predetermined value or less and said second zeolite has pores whose diameters exceed the predetermined value.

3. The exhaust-gas-purifying catalyst set forth in Claim 2 is characterized in that said predetermined value is 5.5 Å.

4. The exhaust-gas-purifying catalyst set forth in Claim 1 is characterized in that said first zeolite is 1/4-1/2 by weight ratio in all zeolites.

5. The exhaust-gas-purifying catalyst set forth in Claim 1 is characterized in that an alkali component selected from the group consisting of alkali metals and alkaline-earth metals is further loaded on said first zeolite.

6. The exhaust-gas-purifying catalyst set forth in Claim 1 is characterized in that a molar ratio of silicon with respect to aluminum (Si/Al) is larger in said first zeolite than in said second zeolite.

7. The exhaust-gas-purifying catalyst set forth in Claim 6 is characterized in that a difference between the molar ratio (Si/Al) of said first zeolite and the molar ratio (Si/Al) of said zeolite is 200 or more.

8. The exhaust-gas-purifying catalyst set forth in Claim 6 is characterized in that said first zeolite is 2/3-1/2 by weight ratio in all zeolites.

9. The exhaust-gas-purifying catalyst set forth in Claim 6 is characterized in that said first zeolite employs mordenite exhibiting 200 or more, ZSM-5 exhibiting 1,000 or more, type "Y" zeolite exhibiting 400 or more, type "A" zeolite exhibiting 400 or more, ferrierite exhibiting 400 or more, or zeolite β exhibiting 200 or more by a molar ratio (Si/Al)."

IV. The decision under appeal was based on a set of seven claims as the only request filed by letter dated 19 November 2007. It was held that the claimed subject-matter contravened the requirements of Articles 123(2) and 76(1) EPC.

V. On 7 October 2008 a Notice of Appeal was lodged against that decision, together with payment of the prescribed fee. The statement setting out the grounds of the appeal was filed on the same day, together with a set of five claims as the main request and two sets of five and four claims respectively as the first and second auxiliary requests.

In response to a communication from the Board in preparation of the oral proceedings, in which several issues under Articles 76(1), 123(2), 84 EPC as well as that of possible double patenting were addressed, the appellant, with a letter dated 28 September 2009, filed three sets of five, four and three claims respectively as the main and two auxiliary requests.

VI. At the oral proceedings before the Board, held on 28 October 2009, after elaborate discussion of several objections raised under Articles 76(1), 123(2) and 84 EPC, the claims then on file were replaced by a single set of three claims as the sole request.

The claims of that sole request read as follows:

"1. A catalyst for purifying an exhaust gas including a soluble organic fraction (SOF), the catalyst reducing and purifying nitrogen oxides in an oxygen rich atmosphere which contains oxygen more than necessary

for oxidizing components to be oxidized in the exhaust gas by hydrocarbon (HC) adsorbed on a zeolite support, characterized in that the aforementioned zeolite support comprises a first zeolite loaded with at least a catalyst metal selected from the group consisting of Pt, Rh, Pd, Ir and Ag and a second zeolite free from loading a catalyst metal, the molar ratio (Si/Al) of silicon with respect to aluminum of the first zeolite is greater than that of the second zeolite by 200 or more, and both the first zeolite and the second zeolite are mixed in a powdered state.

2. The catalyst of claim 1, characterized in that said first zeolite is 1/4-1/2 by weight ratio in all zeolites.

3. The exhaust-gas-purifying catalyst of claim 1 or 2 characterized in that said first zeolite employs mordenite exhibiting 200 or more, ZSM-5 exhibiting 1,000 or more, type 'Y' zeolite exhibiting 400 or more, type "A" zeolite exhibiting 400 or more, ferrierite exhibiting 400 or more, or zeolite β exhibiting 200 or more by a molar ratio (Si/Al)."

VII. The Appellants indicated the instances in the application as filed (Article 123(2) EPC) as well as in the parent application as filed (Article 76(1) EPC) where the claimed subject matter had been disclosed and argued that the requirements of both relevant Articles were therefore complied with.

VIII. The Appellants requested that the decision under appeal be set aside and that a patent be granted on the basis of the sole request filed on 28 October 2009 during the

oral proceedings. At the end of the oral proceedings, the Chairman announced that the debate was closed and that the decision would be given in writing.

- IX. With a letter dated 29 October 2009, the appellants filed two sets of three claims each as auxiliary requests 1 and 2.

Reasons for the Decision

1. The appeal is admissible.

2. *Article 76(1) EPC*

2.1 The present claims contain the following amendments vis-à-vis the parent application as filed (additions to the original claims of the parent application are indicated in bold by the board, deletions in strikethrough, the additions being numbered):

"1. A catalyst for purifying an exhaust gas **including a soluble organic fraction (SOF)**(*addition 1*), the catalyst reducing and purifying nitrogen oxides in an oxygen rich atmosphere which contains oxygen more than necessary for oxidizing components to be oxidized in the exhaust gas by hydrocarbon (HC) adsorbed on a zeolite support, ~~wherein: the exhaust gas purifying catalyst is~~ characterized in that **said the aforementioned** zeolite support (*addition 2*) comprises a first zeolite loaded with **at least** a catalyst metal **selected from the group consisting of Pt, Rh, Pd, Ir and Ag** (*addition 3*) and a second zeolite free from loading a catalyst metal, **the molar ratio (Si/Al) of**

silicon with respect to aluminum of the first zeolite is greater than that of the second zeolite by 200 or more (addition 4), and both the first zeolite and the second zeolite are mixed in a powdered state (addition 5).

~~4~~ 2. The ~~exhaust gas purifying~~ catalyst set forth in of claim 1 ~~is~~, characterized in that said first zeolite is 1/4-1/2 by weight ratio in all zeolites.

~~9~~ 3. The ~~exhaust gas purifying~~ catalyst set forth in of claim ~~6~~ 1 or 2 characterized in that said first zeolite employs mordenite exhibiting 200 or more, ZSM-5 exhibiting 1,000 or more, type 'Y' zeolite exhibiting 400 or more, type "A" zeolite exhibiting 400 or more, ferrierite exhibiting 400 or more, or zeolite β exhibiting 200 or more by a molar ratio (Si/Al)."

2.1.1 Addition 1 regarding the soluble organic fraction (SOF) is not part of the definition of the catalyst structure. At the most it can be interpreted as an indication of the kind of environment in which the catalyst may (but need not necessarily) be used, i.e. the kind of exhaust gas. The basis for that addition can be found on page 1, third and second last lines of the description of the parent application as filed, which describe the aptitude of zeolites for cracking diesel exhaust gases containing SOF. Support for the use of other exhaust gases than diesel exhaust gases can be found in the first paragraph ("Technical Field"), where the treatment of a diesel exhaust gas, **or the like**, is mentioned. Also page 11, second to fourth full paragraphs, in particular the last sentence of the penultimate paragraph, discuss the treatment of exhaust

gases in general. Therefore, the claims comply with Article 76(1) EPC.

2.1.2 Addition 2 is merely of an editorial nature and can be accepted.

2.1.3 Addition 3 finds its basis on page 8, first full paragraph of the parent application as filed, where suitable noble metals for the catalyst are explicitly mentioned. According to that passage, other metals can also be used in combination with the noble metals, so that the insertion of "at least" is also acceptable.

2.1.4 Addition 4 is based on page 14, first full paragraph of the parent application as filed, in which, with reference to claim 6, a difference between the molar ratios Si/Al of the first and the second zeolite of 200 or more is described as being preferred. Claim 6 refers to claim 1, stating that the Si/Al ratio of the first zeolite should be larger than that of the second zeolite. Therefore, amendment 4 can be accepted.

2.1.5 Addition 5 again does not appear to describe directly any characteristic of the claimed catalyst in terms of structure or properties, but rather refers to its preparation by mixing the two zeolites as powders. From the wording of the claim it is clear that the first zeolite is loaded with at least a catalyst metal and brought into powder form before it is mixed with the second zeolite powder. A basis for that way of preparing the claimed catalyst can be found on page 8, third full paragraph, according to which two powdered zeolites are mixed to a mixture powder which can then undergo further treatment such as being pelletized or

- coated. Also, in all examples the zeolites are prepared separately and then mixed as powders. Therefore, amendment 5 complies with Article 76(1) EPC.
- 2.1.6 The deletions are of an editorial nature and can be accepted.
- 2.1.7 It is also permissible to combine the amendments in one claim. The basis for such a combination can be found in the above-cited passages, which refer in general to the claimed catalyst, which, as a consequence, may have all the features as amended.
- 2.2 Apart from the adapted numbering, Claim 2 has the same wording as claim 4 of the parent application as filed, and claim 3 as parent application claim 9. However, they both refer to claim 1 and due to the changes in claim 1, combinations are now claimed that had not been explicitly claimed in this form before.
- 2.2.1 As regards claim 2, the amount of the first zeolite with respect to the total zeolites of 1/4-1/2 by weight ratio had been described in parent application claim 4 with reference to parent application claim 1, as well as on page 7, paragraph bridging pages 7 and 8 of the parent application description as filed.
- The information present in the parent application therefore provides sufficient adequate, consistent support for present claim 2 for it to comply with Article 76(1) EPC.
- 2.2.2 The wording of claim 3 can be found in parent application claim 9 which refers to parent application

claim 6. The paragraph bridging pages 14 and 15 of the parent application description repeats the wording of the claim. On page 14 the embodiments referring to parent application claim 6 are elucidated, amongst which the difference in the Si/Al ratios of the first and the second zeolite, the weight ratio first zeolite/second zeolite, and a specification of possible zeolites suitable for use as the first zeolite. Therefore, the combination of those embodiments finds its basis on that page. Moreover, all the zeolites specified in present claim 3 have Si/Al ratios above 200. For those reasons, the combination of present claim 1 with the specification of the first zeolites of parent application claim 9 can be accepted.

2.3 In view of the above, claims 1 to 3 all comply with the requirements of Article 76(1) EPC.

3. *Article 123(2) EPC*

3.1 The claims of the sole request contain the following amendments vis-à-vis the present application as originally filed (additions to the claims of the present application as filed are indicated in bold by the board, deletions in strikethrough):

"1. A catalyst for purifying an exhaust gas including a soluble organic fraction (SOF), the catalyst reducing and purifying nitrogen oxides in an oxygen rich atmosphere which contains oxygen more than necessary for oxidizing components to be oxidized in the exhaust gas by hydrocarbon (HC) adsorbed on a zeolite support, characterized in that the aforementioned zeolite support comprises a first zeolite loaded with at least

a catalyst metal selected from the group consisting of Pt, Rh, Pd, Ir and Ag and a second zeolite free from loading a catalyst metal, the molar ratio (Si/Al) of silicon with respect to aluminum of the first zeolite is greater than that of the second zeolite ~~and is 160~~ **by 200** or more, ~~said first zeolite is 2/3-1/2 by weight ratio in all zeolites, said first zeolite has pores whose diameters are 5.5 Å or less, and said second zeolite has pores whose diameters exceed 5.5 Å and both the first zeolite and the second zeolite are mixed in a powdered state.~~

2. The catalyst of claim 1, characterized in that said first zeolite is 1/4-1/2 by weight ratio in all zeolites.

~~2~~ 3. The exhaust-gas-purifying catalyst set forth in claim 1 **or 2** characterized in that said **first** zeolite employs mordenite exhibiting 200 or more, ZSM-5 exhibiting 1,000 or more, type "Y" zeolite exhibiting 400 or more, type "A" zeolite exhibiting 400 or more, ferrierite exhibiting 400 or more, or zeolite β exhibiting 200 or more by a molar ratio (Si/Al)."

3.1.1 The change from "and is 160 or more" to "by 200 or more" constitutes a major difference in the claimed subject-matter. As it is however based on page 14, first full paragraph of the application as filed, in which a difference between the molar ratios Si/Al of the first and the second zeolite of 200 or more is described as being preferred, there is support for this change.

3.1.2 The deletions of some of the original catalyst features find their basis in the description, where those various features are described independently from one another and mostly as preferred embodiments only.

The pore diameters are disclosed on page 10, second full paragraph, as a preferred embodiment only. The presence of that feature would collide with present claim 3, which corresponds to original claim 2, as, of those zeolites mentioned in the original application, page 10, last lines, only ferrierite (4,8 Å) and ZSM-5 (5,5 Å) have pore sizes in conformity with the pore size requirements of original claim 1, and already for that reason should be deleted.

3.2 Claim 2 finds its basis in the paragraph bridging pages 7 and 8. That passage is part of the general description of the claimed catalysts ("Disclosure of Invention") so that the combination of features that is claimed by claim 2, with its reference to claim 1, provides no new subject-matter.

3.3 Claim 3 corresponds to original claim 2. The addition of "first" between "said" and "zeolite" in line 2 is supported by the paragraph bridging pages 14 and 15. The reference to claim 2 can be accepted in view of the general description of possible embodiments of the catalyst on pages 4 to 15.

3.4 For those reasons, the present claims fulfil the requirements of Article 123(2) EPC.

4. *Auxiliary Requests*

During the oral proceedings one set of three claims was filed as the only request. At the end of the oral proceedings, the Chairman declared the debate closed. The auxiliary requests filed by letter of 29 October 2009 have therefore been filed after the closure of the debate, so that they cannot be taken into account anymore, and are in any case unnecessary as examination can proceed on the sole request maintained at the oral proceedings.

For those reasons the belatedly filed auxiliary requests are not admitted into the proceedings.

5. *Procedural matters*

- 5.1 The examining division had refused the application for lack of compliance with Articles 76(1) and 123(2) EPC. The Board is satisfied that, due to the amendments made during the oral proceedings, the claims now on file satisfy the requirements of Article 76(1) and 123(2) EPC, so that the reasons for refusal of the application do not apply to the present request. As the substantive issues of novelty and inventive step have not yet been the subject of discussion, the Board, exercising its discretion under Article 114(1) EPC, remits the case to the examining division for further prosecution on the basis of the claims filed during the oral proceedings before the Board.

- 5.2 A thorough examination under Article 84 EPC needs to be carried out. Although the claims are perhaps not ideally formulated, they are sufficiently clear for the skilled person to understand their meaning. The description is however another matter and it should be brought into conformity with the claims after those have been found to comply with Articles 54 and 56 EPC. The numerous contradictions and incongruities between the present claims and some parts of the description as well as within the description itself should be removed. In the examples it should be clearly indicated which examples fall under the subject-matter now being claimed and which do not, or else the latter examples should be deleted. Terms such as "reference" examples where "comparative" examples are also present, should be clarified. Also, any further amendment to the claims should be reflected in the description.
- 5.3 Finally, the scope of the present claims overlaps that of granted parent patent EP-B-1 027 930 since the present claims do not exclude the presence of an alkali component and its presence as part of "the present invention" is even disclosed on page 11, second full paragraph, of the present description as filed. Also, the amount of the first zeolite is not limited in any way in claim 1 (claim 2 mentions the same amount of 1/4 to 1/2 of all zeolites as in granted parent claim 1). On the other hand, though the granted parent claims do not require the present minimum difference between the Si/Al ratios of the zeolites, that feature is not excluded there.

Should the examining division come to the conclusion that a set of claims before it is in principle allowable, the issue of double patenting needs to be carefully checked.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the first instance for further prosecution on the basis of the set of claims filed during the oral proceedings on 28 October 2009.

Registrar

Chairman

S. Fabiani

S. Perryman