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Datasheet for the decision of 4 July 2007

Case Number: T 0946/03 - 3.3.05

Application Number: 01115310.3

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Language of the proceedings: EN

Title of invention:
Exhaust gas purifying catalyst

Applicant:
MITSUBISHI JIDOSHA KOGYO KABUSHIKI KASISHA

Opponent:
-

Headword:
NO_x catalyst with inhibiting layer/MITSUBISHI

Relevant legal provisions:
EPC Art. 54, 84, 123(2)

Keyword:
"Main request (added matter: yes)"
"Auxiliary request (novelty: yes)"

Decisions cited:
-

Catchword:
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Case Number: T 0946/03 - 3.3.05

D E C I S I O N
of the Technical Board of Appeal 3.3.05
of 4 July 2007

Appellant: MITSUBISHI JIDOSHA KOGYO KABUSHIKI KAISHA
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 4 March 2003 refusing European application No. 01115310.3 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: M. Eberhard
Members: J.-M. Schwaller
S. Hoffmann

Summary of Facts and Submissions

I. The appeal was lodged against the decision of the examining division to refuse the European patent application No. 01115310.3. The decision was based on claims 1-3, 5, 7 as originally filed and claims 4, 6 as faxed on 10 February 2003.

II. The examining division *inter alia* relied upon the prior art documents EP-A-1078678 (D1), EP-A-0931590 (D2) and EP-A-1008378 (D3).

III. In the contested decision, it was held that the subject-matter of claims 1-7 lacked novelty under Article 54(3) and (4) EPC over D1. In particular, Dl disclosed that an inhibiting agent was present so as to inhibit movement of the absorbent agent toward the carrier, several positions for this inhibiting agent being possible, in particular a layer of inhibiting agent positioned between the carrier and the catalyst layer, in said catalyst layer, and on an external surface of said catalyst layer. Claim 8 of D1 stated that the inhibiting agent was positioned in **at least one** of these positions. Combinations of positions were thus evenly disclosed, one of the combinations being a layer of inhibiting agent between the carrier and the catalyst layer together with an inhibiting agent in the catalyst layer, as in claim 1 then on file.

IV. The grounds of appeal were based on the same set of claims as the contested decision.

V. In a first communication, the board raised several objections under Articles 84 (lack of clarity) and

123(2) EPC. In particular, it pointed out that the feature "*acid material with a high affinity with respect to said absorbent*" did not clearly define the scope of protection of claim 1 then on file, because it was not clear for the skilled person what was meant by a "*high affinity*" with respect to the absorbent; furthermore the expression "*high affinity*" had no well-recognized technical meaning in the relevant art.

Insofar as the lack of clarity permitted examination of the claimed subject-matter, the board observed that claim 1 then on file appeared to be novel over D1, but not over D2 or D3.

VI. With a letter dated 22 February 2007, the appellant submitted two sets of claims respectively as main and auxiliary requests. It also filed an English translation of the priority document of the present application.

VII. In a second communication sent with the summons to oral proceedings, the board raised an objection of lack of clarity against claim 1 and questioned the allowability of the amendments under Article 123(2) EPC. In particular, it observed that in claim 1 of both requests the omission of the feature "*with a high affinity with respect to said absorbent agent*", originally present in claim 1 as filed, had no basis in the application as filed.

VIII. With a letter dated 20 June 2007, the appellant filed four sets of claims respectively as main and 1st to 3rd auxiliary requests.

IX. During the oral proceedings which took place on 4 July 2007, it was in particular discussed whether the combination of features in amended claim 2 of the main request met the requirements of Articles 123(2) EPC. The question was also raised whether the list of materials in claim 6 was consistent with the expression "*material which due to its cation exchange capability fixes the absorbent agent in the catalyst layer*" stated in claims 1 and 2. After discussion, the appellant filed two new sets of claims 1-5 and 1-4 respectively as a main and a first auxiliary request. The further auxiliary requests were withdrawn.

Independent claims 1 and 2 of the main request read as follows:

"*1. An exhaust gas purifying catalyst, which includes a carrier (10) and a catalyst layer (30), wherein at least one material selected from a group of alkali metals and alkaline earth metals is added as an NO_x absorbent agent to the catalyst layer, acid material (40) composed of zeolite with a high affinity with respect to said NO_x absorbent agent, is mixed in said catalyst layer (30), and an inhibiting layer (20) mainly composed of silica (SiO_2) is formed between said catalyst layer (30) and said carrier (10) so as to inhibit movement of said absorbent agent toward said carrier (10).*

2. An exhaust gas purifying catalyst, which includes a carrier (10) and a catalyst layer (30), wherein at least one material selected from a group of alkali metals and alkaline earth metals is added as an NO_x absorbent agent to the catalyst layer, acid material

(40) composed of zeolite with a high affinity with respect to said NO_x absorbent agent, is mixed in said catalyst layer (30), and an inhibiting layer (20) mainly composed of $BaSO_4$ is formed between said catalyst layer (30) and said carrier (10) so as to inhibit movement of said absorbent agent toward said carrier (10)."

Claim 1 of the auxiliary request is identical to claim 1 of the main request. Independent claim 2 was deleted.

X. Regarding the allowability under Article 123(2) EPC of the amendments in claim 2 of the main request, the appellant argued that a basis for the combination of an acid material (40) composed of zeolite and of an inhibiting layer (20) mainly composed of $BaSO_4$ could be found in the last paragraph of page 3, the first and second paragraphs of page 4 as well as the first paragraph of page 5 of the application as filed.

XI. 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 in the alternative of the 1st auxiliary request, both filed during the oral proceedings.

Reasons for the Decision

Main request

1. *Claim 2 - Allowability under Article 123(2) EPC*

The question arises whether the specific combination of an inhibiting layer mainly composed of $BaSO_4$, an acid material composed of zeolite in the catalyst layer, and at least one material selected from alkali metals and alkaline earth metals as NO_x absorbent in the catalyst layer, is disclosed in the application as filed.

1.1 From the passages indicated by the appellant (see item X *supra*), it is observed that the last paragraph of page 3 describes the specific embodiment wherein a zeolite as the acid material is combined **with** an inhibiting layer composed mainly of silica (*emphasis added by the board*), the NO_x absorbent agent being an agent such as potassium and barium.

The first paragraph of page 4 is dedicated to zeolite as the acid material 40, zeolite being *inter alia* presented therein as "*a main component of the acid material 40*" (page 4, line 2). The second paragraph deals with the influence of the composition of the zeolite on the durability of the acid material and its ability to fix the absorbent agent. The last two lines (page 4, lines 18-19) of this second paragraph explain that titanium dioxide (TiO_2) achieves the same effect as the zeolite and may be mixed instead of zeolite in the catalyst layer 30.

1.2 On page 4, lines 20-22, the acid material 40 is described as being "**preferably** composed of Group-IV, Group-V and Group-VI transition elements or Group-IV, Group-V and Group-VI typical elements (e.g. Si, P, S, V, Cr, As, Nb, Mo, and W)". In lines 23-26, same page, it is further stated that "in view of the reactivity with the absorbent agent, the acid material (50) (sic) is **preferably** composed of silicon (Si) or tungsten (W) that never disturbs the reaction of NO_x and the absorbent agent in the case where the absorbent agent is composed of potassium".

1.3 It follows from the above that although zeolite is described as a main component of the acid material 40, other elements are also explicitly contemplated in the description as preferred components for the acid material. According to the present application, zeolite is therefore one specifically quoted acid material among a list of other - not less preferred - acid materials.

The combination of an acid material composed of zeolite and an inhibiting layer composed of silica - individualised for example in claim 5 as filed - is described as a preferred embodiment.

1.4 The inhibiting layer 20 is described in the passage from page 4, lines 27-33 to page 5, line 9 as being composed *"mainly of silica*" or "*of tungsten instead of silica*", or formed of "*titanium dioxide, alkali metal such as barium, basic material such as barium oxide (BaO) or the like, […], a material such as zeolite having a large specific surface area, an element chemical compound composed mainly of stable basic*

material with a high molecular weight such as barium sulphate ($BaSO_4$), a material with a small crystal lattice, or the like." In the lines 4-9 of page 5, an example using an inhibiting layer mainly composed of silica is disclosed.

$BaSO_4$ is thus not described as a preferred material for the inhibiting layer in the application as filed, it is just one compound among a list of materials suitable for the inhibiting layer 20. A combination of an inhibiting layer (20) mainly composed of $BaSO_4$ and an acid material (40) composed of zeolite is not individualised in the application as filed.

1.5 In consequence, since the application as filed does not describe the specific combination of a zeolite as the acid material 40 with an inhibiting layer 20 mainly composed of $BaSO_4$ and since in order to arrive at this specific combination, a choice has to be made from the two separate lists of materials identified in points 1.1 to 1.4 *supra*, it is concluded that the subject-matter of claim 2 extends beyond the content of the application as filed (Article 123(2) EPC). The main request is therefore rejected.

First auxiliary request

2. *Allowability of the amendments under Article 123(2) EPC*

The claims of this request differ from those of the main request by the deletion of claim 2 and the renumbering of the dependent claims. Present claims 1-4 have a basis as follows in the application documents as filed:

– claim 1: in claims 1 and 5 as well as in page 3, lines 36 and 37 of the description;

– claims 2, 3 and 4: respectively in original claims 2, 3 and 7.

This set of claims thus fulfils the requirements of Article 123(2) EPC.

3. *Clarity (Article 84 EPC)*

The objections of lack of clarity raised in the board's communications or during the oral proceedings no longer apply to the present claims. In particular, dependent claim 6 objected to at the oral proceedings has been deleted and in claim 1 the "*acid material with a high affinity with respect to said NO_x absorbent agent*" is now defined as being "*composed of zeolite*". The latter amendment overcomes in particular the objection previously raised against the expression "*high affinity*".

4. *Novelty*

4.1 *D1 (prior art under Article 54(3) and (4) EPC)*

D1 (claim 1) discloses an exhaust gas purifying catalyst including a carrier and a catalyst layer to which at least one of alkali metal and alkaline earth metal is added as an absorbing agent. An inhibiting agent (30, 120, 140, 150) is provided in said catalyst layer in order to inhibit a movement of said absorbing agent in said catalyst.

In claim 2 (dependent on claim 1), the inhibiting agent (30) is dispersed and mixed in the catalyst layer.

In claim 7, which is dependent on claim 1 **only**, the inhibiting agent (120, 140, 150) is provided in the form of a layer in the catalyst layer (130). In claim 8, which is dependent on claim 7 **only**, the layer of inhibiting agent (120, 140, 150) is formed at at least one position among the following positions: a position between the carrier (110) and the catalyst layer (130), in said catalyst layer (130), and an external surface of said catalyst layer (130).

Figures 7 to 10 illustrate embodiments wherein the inhibiting layer (120, 140, 150) is located between the carrier and the catalyst layer (130).

Paragraph [0068] of the description (cited in the contested decision) discloses that according to the 3rd through 5th embodiments (i.e. those of Figures 7, 9 and 10), one inhibition layer 120, 140 or 150 is formed on the external surface of the carrier 110 between the carrier 110 and the catalyst layer 130, but the number and position of inhibition layers should not be restricted to this. For example, one inhibition layer may be formed on the external surface of the catalyst layer. In the case of a catalyst with a plurality of catalyst layers, one or more inhibition layers may be formed at at least one position between the carrier and the catalyst layer, inside the catalyst layer or on the external surface of the catalyst layer. This paragraph thus relates exclusively to the embodiments according

to Figures 7, 9 and 10 wherein the inhibiting agent is provided in the form of a layer.

It is thus to be noted that in D1 the embodiment wherein the inhibiting agent is dispersed and mixed in the catalyst layer is dealt with separately from those wherein the inhibiting agent is provided in the form of a layer in the catalyst layer. A **combination** of (i) an acid material mixed in the catalyst layer **and** (ii) an inhibiting layer formed between the catalyst layer and the carrier is therefore not directly and unambiguously derivable from D1. Consequently, D1 does not destroy the novelty of claim 1.

4.2 D2 discloses, in particular in claim 18 and in [0020], an exhaust gas purifying catalyst having a catalyst layer on a substrate and containing a NO_x adsorbent, said catalyst layer comprising (i) a catalyst inner layer formed on said substrate, said inner layer comprising a catalytic component carrying Pt and said NO_x adsorbent on a mixture of alumina and CeO_2 but containing no Rh and a catalyst component carrying Rh and said NO_x adsorbent on at least one kind of metal oxide selected from a group including oxides of Mn, Co, Ti and Fe but containing no Pt; and (ii) a catalyst outer layer formed over said catalyst inner layer, said catalyst outer layer comprising catalytic component which carries Pt, Rh and said NO_x adsorbent on zeolite.

The inner catalyst layer, which might be suitable as an inhibiting layer in the sense of present claim 1, being not described in D2 as comprising silica, let alone mainly composed of silica, the subject-matter of

present claim 1 is thus not anticipated by the content of D2.

4.3 D3 (claims 1, 2 and 7) discloses an exhaust gas purifying catalyst having (i) a first catalyst layer formed on a substrate, said layer containing a NO_x absorbing component comprising at least one kind of element selected from a group of alkaline earth metals, a group of alkali metals and a group of rare earth elements, and (ii) a second layer formed on said substrate and disposed so as to be brought into contact with the exhaust gas before the first layer, the second layer containing a component other than said NO_x absorbing component, selected between potassium (K) and sodium (Na). The second layer may also contain zeolite on which is carried a transition metal.

The first catalyst layer - which might be suitable as an inhibiting layer in the sense of present claim 1 - is however not described in D3 as comprising silica, let alone as being mainly composed of silica.

The novelty of claim 1 is thus also established over D3.

4.4 The remaining document cited in the search report also does not disclose the subject-matter of present claim 1.

4.5 Accordingly, for the above reasons, claim 1 (and thus also its dependent claims 2-4) fulfils the requirements of Article 54 EPC.

5. *Remittal*

Since the examining division has not yet addressed the inventive step issue, the Board considers it appropriate to exercise its power conferred by Article 111(1) EPC to remit the case to the first instance for further prosecution.

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.

The Registrar: The Chairman:

C. Vodz M. Eberhard