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**Datasheet for the decision
of 18 October 2006**

Case Number: W 0019/05 - 3.3.07

Application Number: PCT/EP 2004/013913

Publication Number: WO 2005/058488

IPC: B01J 23/10

Language of the proceedings: EN

Title of invention:

Process for the preparation of an oxidic catalyst composition comprising a divalent and a trivalent metal

Applicant:

AKZO NOBEL N.V.

Opponent:

-

Headword:

-

Relevant legal provisions:

PCT Art. 17.3(a)

PCT R. 13.1, 13.2, 40.1, 40.2(c), 40.2(e)

Keyword:

"Lack of unity a posteriori (yes)"

"Protest dismissed (yes)"

Decisions cited:

-

Catchword:

-



Case Number: W 0019/05 - 3.3.07

International Application No. PCT/EP 2004/013913

D E C I S I O N
of the Technical Board of Appeal 3.3.07
of 18 October 2006

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Decision under appeal: Protest according to Rule 40.2(c) of the Patent Cooperation Treaty made by the applicants against the invitation (payment of additional fees) of the European Patent Office (International Searching Authority) dated 4 April 2005.

Composition of the Board:

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

Summary of Facts and Submissions

- I. International application PCT/EP2004/013913, filed on 6 December 2004 and published under No. WO 2005/058488, contains 14 claims. The independent claims read as follows:

Claim 1

"A process for the preparation of an oxidic catalyst composition consisting of one or more trivalent metals, one or more divalent metals and - calculated as oxide and based on the total composition - more than 18 wt% of one or more compounds selected from the group consisting of rare earth metal compounds, phosphorous compounds, and transition metal compounds, which process comprises the following steps:

- (a) preparing a precursor mixture consisting of (i) a compound 1 being one or more trivalent metal compounds, (ii) a compound 2 being one or more divalent metal compounds, (iii) a compound 3 which is different from compounds 1 and 2 and is one or more compounds selected from the group consisting of rare earth metal compounds, phosphorous compounds, and transition metal compounds, and (iv) optionally water, which precursor mixture is not a solution,
- (b) if the precursor mixture contains water, optionally changing the pH of the slurry,
- (c) optionally aging the precursor mixture,
- (d) drying the precursor mixture when this mixture contains water and/or aging step c) is performed, and
- (e) calcining the resulting product."

Claim 12

"Oxidic catalyst composition obtainable by the process according to any one of the preceding claims."

Claim 13

"Catalyst particle comprising the oxidic catalyst composition according to claim 12, a matrix and/or filler, and a molecular sieve."

Claim 14

"Use of the oxidic catalyst composition of claim 12 or the catalyst particle of claim 13 in a fluid catalytic cracking process."

- II. With a communication posted on 4 April 2005, the European Patent Office (EPO), in its capacity as International Searching Authority (ISA), issued an invitation under PCT Article 17(3)(a) and Rule 40.1 to pay an additional search fee since the international application contained two inventions so that the requirements of unity as laid down in PCT Rules 13.1, 13.2 and 13.3 were not met.

The ISA argued as follows:

The oxidic catalyst composition was defined by its process of preparation (Claim 12).

An oxidic catalyst composition obtainable by a process of preparation starting from a precursor mixture consisting of an aluminium compound, a magnesium compound and bastnaesite, which mixture was not a solution, was known from the disclosure of

US-A-5 545 604 (hereinafter D3). That oxidic catalyst composition was used as SO_x-additive in FCC processes.

An oxidic catalyst composition defined by the features disclosed in D3 could thus not constitute a common inventive idea.

The additional feature of Claim 12 of the present application was the specific compound 3, which could be a rare earth metal compound or a zinc compound.

It was apparent from the description of the present application that an oxidic catalyst composition wherein compound 3 was a rare earth metal compound was useful as metal trap whereas an oxidic catalyst composition wherein compound 3 comprised zinc was useful to reduce the sulphur content. Thus, the alternative compounds 3 addressed different problems, such that there was no technical relationship between those alternatives.

Consequently, the requirement of unity of invention referred to in Rule 13.1 PCT was a *posteriori* not fulfilled having regard to D3, and two groups of inventions were identified as follows:

(1) a process for the preparation of an oxidic catalyst composition comprising magnesium as divalent metal and aluminium as trivalent metal, the oxidic catalyst composition obtainable by said process, a catalyst particle comprising that oxidic catalyst composition, and the use of that oxidic catalyst composition or the catalyst particle in a FCC process, as defined in claims 1, 12, 13 and 14, when relating to the

alternative wherein compound 3 comprised a rare earth metal;

and

(2) a process for the preparation of an oxidic catalyst composition comprising magnesium as divalent metal and aluminium as trivalent metal, the oxidic catalyst composition obtainable by said process, a catalyst particle comprising that oxidic catalyst composition, and the use of that oxidic catalyst composition or the catalyst particle in a FCC process, as defined in claims 1, 12, 13 and 14, when relating to the alternative wherein compound 3 comprised a zinc compound.

III. The applicants paid the additional search fee on 3 May 2005. That payment was made under protest (Rule 40.2c) and argued as follows:

It was clearly set out on page 2, lines 15 to 25, of the present application that the invention not only resulted in a catalyst having improved metals trap performance, but also resulted in a fuel having reduced sulphur and nitrogen content. The reduced sulphur and nitrogen content should be considered an additional advantage of the same catalyst composition. This neither implied a different technical teaching nor lack of unity. Unity should be assessed on the basis of the claims and not merely on the basis of the examples. The fact that examples 22-28, comprising zinc as compound 3, showed the usefulness for reduction of the sulphur content did not imply that those catalyst compositions did not have metal trap performance. Therefore, the

subject-matter as claimed met the requirements of unity of invention and no additional search fee was necessary.

- IV. Pursuant to PCT Rules 40.2(c)(e), on 1 July 2005 the ISA mailed a notification regarding review of justification for invitation to pay an additional search fee, informing the applicants that, according to the review body constituted in the framework of the ISA, the invitation to pay the additional search fee was justified, because the application lacked unity of invention for the reasons stated in the "Invitation to Pay Additional Fees". Thus, the request for refund of the additional search fee presented by the applicants was found to be not justified, and the request of the ISA for that payment was upheld. Furthermore, the applicants were invited to pay the protest fee (Rules 40.2(e) PCT).
- V. By letter dated 11 July 2005, received on 12 July 2005, the applicants (appellants) paid the protest fee.

Reasons for the Decision

1. The protest is admissible.
2. Claim 12 concerns an oxidic catalyst composition that is obtainable by the process according to any one of claims 1 to 11.
 - 2.1 According to the process of preparation defined in Claim 1, the oxidic catalyst composition should consist of:

- (a) a compound 1, which is or more trivalent metal compounds;
- (b) a compound 2, which is one or more divalent metal compounds; and
- (c) more than 18 wt% (calculated as oxide based on the total composition) of a compound 3, which is different from compounds 1 and 2 and is one or more compounds selected from the group consisting of:
 - (i) rare earth metal compounds;
 - (ii) phosphorous compounds; and,
 - (iii) transition metal compounds,

and can be prepared by mixing the dry precursor compounds as such and calcining that mixture.

Optionally, a precursor mixture in water is prepared, which is not a solution, the pH of which is optionally changed, which dispersion is optionally aged, then dried and finally calcined (Claim 1).

- 3. Since compound 3 can be selected among transition metals, rare earth metals and phosphorous compounds, different groups of oxidic catalyst compositions are encompassed by the claims of the present application.
- 3.1 The features common to the three different groups of oxidic catalyst compositions defined in Claim 1 are the classes to which compounds 1 and 2 belong and the amount of compound 3, as well as the process steps for their preparation.
- 3.2 According to the ISA, those common features were known from D3, which the appellants did not contest. In view of the disclosure of D3, in particular Claims 1 and 8, the Board concurs with the opinion of the ISA that the

common features in the definition according to present Claim 1 are known from D3 and hence cannot form a single general inventive concept linking together the different groups of oxidic catalyst compositions.

- 3.3 Therefore, the question to be answered is whether or not the different groups of oxidic catalyst compositions encompassed by Claim 12 are nevertheless linked by a single general concept having regard to their properties.
- 3.4 According to the description, the object of the present application is to provide a process for the preparation of an oxidic catalytic composition with improved metal trap performance (page 1, lines 23 and 24). According to page 2, lines 15 to 17, apart from an improved metal trap performance, the process according to the invention also provided compositions which were suitable as FCC additives for the production of fuels with a reduced sulphur and nitrogen content. Based on that passage, the appellants argued that the latter was an additional advantage regarding the same compositions that had an improved metal trap performance.
- 3.5 However, that passage does not indicate that the advantageous properties relate to one and the same composition. Another possible interpretation would be that the claimed process results in two groups of different compositions: one having improved metal trap properties, the other resulting in fuel with a reduced sulphur and nitrogen content. Nothing in the cited passage links the two properties together as being combined in one and the same composition. On the contrary, other passages in the description as well as

the examples indicate a separation between both properties and the compounds involved.

- 3.5.1 As to the description, the rare earth compounds to be used are discussed on page 6, lines 21 to 28. Mixtures are also mentioned, in particular of Ce and La, which is preferred when the oxidic catalyst composition is to be used as a metal trap.

The passage starting on page 6, line 30, and ending on page 7, line 4, sums up the preferred transition metals. Although cerium is mentioned on page 7, line 3, no suggestion to combine the preferred transition metals such as zinc and the preferred rare earth metals such as lanthanum and cerium for obtaining compositions having improved metal trap performance is given.

On page 10, the possible usages of the claimed oxidic catalyst compositions are mentioned. According to lines 17 to 20, the oxidic catalyst composition is very suitable for use in FCC processes for the reduction of SO_x and NO_x emissions, reduction of the sulphur and nitrogen content of fuels like gasoline and diesel, and for the entrapment of metals like V and Ni. This passage makes not clear if all these properties would be present in one and the same composition.

The following passages however give a clear indication that that is not the case, since:

- for the reduction of the sulphur and the nitrogen content of fuels, compositions comprising Al as compound 1, Mg as compound 2, and at least 18 wt% of Zn or a combination of Zn and Ce, W, V or Mo are preferred (lines 21 to 25); whereas,

- for use as a metal trap compositions comprising Al as compound 1, Mg as compound 2 and at least 18 wt% of La are favoured (lines 26 to 28).

Hence, it is apparent that when zinc is present, even in combination with Ce, it is used for reducing the sulphur and the nitrogen content of fuels. Instead, lanthanum is preferably used for metals trapping purposes. For the latter purposes, the use of zinc, alone or in combination with lanthanum and/or cerium, is not mentioned in the present application.

3.5.2 As regards the examples, the following picture can be gathered:

- (a) the application as filed contains Examples 1 to 30 (concerning the preparation of the claimed compositions), Comparative Example A and Comparative Example B (concerning compositions prepared according to the process of EP-A-0 554 968) as well as Example 31 (testing the suitability as vanadium trap in FCC units) and Example 32 (testing the suitability as FCC additive for the production of sulphur-lean hydrocarbons);
- (b) As compound 3, the following ingredients, alone or in combination, are used in the examples:
 - (i) rare earth metals : lanthanum in Examples 1 to 6, 11, 29 and 30; cerium in Examples 12, 13, 14, 19, 26 and 28;
 - (ii) phosphorus compounds: none;
 - (iii) transition metals: titanium in Examples 7 and 8; zirconium in Examples 9 and 10; vanadium in Examples 14, 16, 17, 19, 25, 28; iron in Examples 15 and 16; copper in

Examples 20 and 21; manganese in Example 20; chrome in Example 21; tungsten in Example 23; molybdenum in Example 27; zinc in Examples 22 to 28. Zinc and cerium are used together in Example 26 only;

- (c) samples of the calcined products resulting from Examples 1, 3, 4, 11, 29 and 30 (hence, all containing lanthanum as compound 3) are tested for their suitability as vanadium trap in a FCC unit in Example 31, together with Comparative Catalysts A and B, hydrotalcite and barium titanate. It can be gathered from that testing that oxidic catalytic compositions containing aluminium, magnesium and lanthanum are better metal traps not only than those according to EP-A-0 554 968 but also than the conventional metal traps as well. Nothing is said as to whether these samples are also suitable to reduce the sulphur and the nitrogen content of fuels;
- (d) samples of the calcined products obtained in Examples 22 to 28, all of which contain zinc, are tested for their suitability as FCC additives for the production of sulphur-lean hydrocarbons in Example 32. It can be seen from these tests that oxidic catalyst compositions comprising aluminium, magnesium and zinc are capable of producing hydrocarbons with a sulphur content which is reduced compared to a 100 wt% E-cat sample. Nothing is said as to whether those compositions are also effective as metals trap.

3.5.3 It follows from the foregoing that in the whole description no mention or even suggestion is present that the same oxidic catalyst compositions would

possess both properties at the same time, namely improving the metals trap performance while reducing the sulphur and the nitrogen content of fuels. This is particularly evident from the fact that when zinc is used in combination with cerium in the oxidic catalyst composition of Example 26, that composition is only tested (Example 32) for assessing its performance at reducing the sulphur and the nitrogen content of fuels, not however its metals trap performance (see Table 1 of Example 31).

- 3.5.4 The only instance where rare earth compounds are generally mentioned in combination with transition metals is Claim 9, in which the use of a "compound selected from the group consisting of Cu, Zn, Zr, Ti, Ni, Co, Fe, Mn, Cr, Mo, W, V, Ce, La and mixtures thereof" is claimed. However, the possibility to mix at random the listed compounds mentioned in Claim 9 has no support in the description, and in view of the above analysis it is doubtful whether this broad and general formulation is correct in the sense that it would intend to allow for the mixing of rare earth metals and transition metals to achieve both performances.
- 3.5.5 For the above reasons, it is concluded that the oxidic catalyst compositions containing at least 18 wt% of a rare earth metal, which are useful as metals trap, and the oxidic catalyst compositions containing at least 18 wt% of a transition metal such as Zn, which are useful in the reduction of the sulphur and the nitrogen content of fuels, constitute two separate groups of inventions, each addressing a different problem.

4. Since both the metal trap performance and the fuel sulphur and nitrogen content reduction are sought-for in FCC processes, the separate groups of inventions mentioned above are generally linked by their suitability as additive or catalyst or adsorbent in said processes. However, also the oxidic compositions disclosed by D3 are suitable for use in FCC processes (see Claim 48). Therefore, also that functional link is already known from D3.

5. According to the appellants, the assessment of unity of invention should be based on the claims, not only on the examples. However, the question whether a single general inventive concept is present cannot, for most cases, be answered on the basis of the claims alone. The description as well as the examples do play a role in finding the presence of any inventive concept(s); the appellants themselves referred to a passage in the description. Therefore, the appellants' submissions, either based on the presence of an additional performance or on the way of assessing unity of invention, fail to establish unity of invention for the present international application. The reasoning in the invitation under Rule 40.1 PCT is correct.

6. For the foregoing reasons, the Board comes to the conclusion that the separate groups of inventions defined in the group of Claims 1 to 7 and 9 to 14 are not linked by a single general inventive concept and, consequently, that the invitation made under Rule 40.1 PCT to pay an additional search fee was justified.

Order

For these reasons it is decided that:

The protest is dismissed.

The Registrar:

The Chairman:

C. Eickhoff

B. ter Laan