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D E C I S I O N
of 27 July 1999

Case Number: T 0769/96 - 3.3.5

Application Number: 88300770.0

Publication Number: 0284181

IPC: B01D 53/36

Language of the proceedings: EN

Title of invention:

Catalyst and process for abatement of NOx in exhaust gases

Patentee:

Mobil Oil Corporation

Opponent:

VAW Vereinigte Aluminium-Werke AG, Berlin und Bonn

Headword:

Denox catalyst/MOBIL

Relevant legal provisions:

EPC Art. 54(1)

Keyword:

"Novelty - yes, no implicit disclosure"

Decisions cited:

-

Catchword:

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Boards of Appeal

Chambres de recours

Case Number: T 0769/96 - 3.3.5

D E C I S I O N
of the Technical Board of Appeal 3.3.5
of 27 July 1999

Appellant: Mobil Oil Corporation
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Respondent: VAW Vereinigte Aluminium-Werke AG
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Representative: Müller-Wolff, Thomas, Dipl.-Ing.
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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 17 June 1996
revoking European patent No. 0 284 181 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: R. K. Spangenberg
Members: G. J. Wassenaar
M. B. Günzel

Summary of Facts and Submissions

- I. The appeal is from the decision of the Opposition Division to revoke European patent No. 0 284 181. The decision was based on two sets of amended claims filed on 19 January 1996 for different contracting states. The broadest independent claim is claim 1 for the contracting states AT, CH, ES, GR, LI and SE, which reads as follows:

"A process for treating industrial exhaust gas contaminated with NO_x at 200 to 600°C with ammonia over a porous crystalline siliceous material having a pore size of at least 5 A.U. (0.5nm) characterized by use of a crystalline material having a Dynamic Response Index (DRI) above 25, which Index has been determined by contacting the crystalline material with gas containing 1 mol% NO₂, 5 mol% NH₃, and 0.75 mol% O₂ in nitrogen at a temperature of 343°C and a gas hourly space velocity of 6000/hr, the Index being calculated from the relation $DRI = 100 \times t_{ref}/t_c$ wherein t_{ref} is a reference time constant equal to 4 minutes and t_c is a time constant for the crystalline siliceous material."

Claim 1 for the other designated Contracting States only differs therefrom by the addition of the definition of t_c in agreement with the description.

- II. The Opposition Division held that the amendments satisfied the requirements of Article 123 EPC and that the amended claims 1 were clear within the meaning of Article 84 EPC. It was further indicated that the invention was sufficiently clear and complete to be

carried out by a person skilled in the art (Article 83 EPC). The Opposition Division found, however, that the subject matter of claim 1 of both sets of claims lacked novelty over

D1: DE-A-2 912 269.

It was argued that said document disclosed the use of the sodium form of the zeolite ZSM-5 in a process of reducing NO_x in exhaust gases with ammonia, and that, according to example 6 of the patent in suit, such zeolites have a DRI of 100.

III. With the statement of the grounds of appeal the appellant filed two alternative sets of claims 1 to 5, one for each group of contracting states as an auxiliary request. The appellant essentially argued that D1 neither explicitly nor implicitly disclosed the use of a zeolite having a DRI above 25.

The appellant requested that the decision under appeal be set aside and the patent be maintained in all designated states with the claims filed on 19 January 1996 or alternatively to maintain the patent in all the designated states with the claims filed with the statement of grounds.

IV. In response to a communication of the Board the appellant requested that if the Board would come to the conclusion that the subject matter of either the main or auxiliary request was novel the case be remitted to the first instance for further prosecution in order to have the first instance decision on inventive step.

- V. The respondent did not file any submissions in the appeal proceedings.

Reasons for the Decision

1. The appeal is admissible.
2. *Main request*
 - 2.1 The only ground mentioned in the contested decision for revoking the patent in suit was lack of novelty over D1. This document discloses a process for treating industrial exhaust gas contaminated with NO_x at 200 to 500°C with ammonia over an aluminosilicate molecular sieve with a pore diameter of at least 0.6 nm. The catalyst is present on the surface of a honeycomb structure of amorphous alumina-silica. Synthetic mordenit is the preferred zeolite but high silica ZSM-5 is also said to be suitable (pages 25 to 27). Specifically disclosed is a catalyst comprising 29% ZSM-5, obtained by treating 39.3 g of an amorphous alumina-silica honeycomb structure under hydrothermal conditions with 7 g NaOH, 45 g tetrapropylammoniumbromide (TPAB) and 210 ml water, followed by washing with water and drying. This example was presented to demonstrate the forming of ZSM-5 on the surface of an amorphous alumino-silica honeycomb structure (page 23). D1 does not indicate that this product is used as catalyst in a process for the reduction of NO_x in flue gases. In fact, without modification, such a product cannot be used for said purpose since it contains a substantial amount of

tetrapropylammonium (TPA) and water, which have to be removed before use. D1 further discloses that for use of the catalyst in a process for the reduction of NO_x in flue gases in the presence of ammonia the acid form of the zeolite is generally used (page 25, second paragraph). D1 does not disclose in detail how the acid form is prepared but discloses in general terms that unwanted cations which are present as a result of the synthesis can be replaced by more appropriate cations by an ionic exchange process (page 21). It is however generally known in the art to prepare the acid form of ZSM-5 by ion exchange of the as-prepared TPA-form with ammonium ions and to calcine the exchanged product to remove ammonia and water. D1 is silent about the DRI-index of the zeolites.

- 2.2 According to the contested decision, the activated ZSM-5 in the above-mentioned example of D1 is in its sodium form. Because according to example 6 of the patent in suit the sodium form of ZSM-5 had a DRI of 100, it was concluded that the product of said prior art example also had a DRI of 100. The Board does not exclude that said prior art product after activation will contain some sodium ions but this does not mean that it is in its sodium exchanged form as indicated in example 6 of the patent in suit. In the ZSM-5 structure of the product of said prior art example the predominant cation is TPA which forms the cations in the crystal lattice of ZSM-5 during its formation. In order to obtain the ZSM-5 in its sodium form, the as prepared ZSM-5 must be ion exchanged with sodium ions. D1, however, does not disclose such a treatment but proposes to use the activated acid form as denox catalyst. As indicated earlier under item 2.1 above, to

obtain such an activated catalyst the TPA containing product obtained in the hydrothermal treatment is ion exchanged with ammonia and then calcined. The resulting product would correspond to the catalyst of example 1 of the patent in suit, having a DRI index of 6. The compositions of both the as-prepared form and the activated form of the ZSM-5 containing product of D1 are therefore essentially different from the product of example 6 of the patent in suit. There is thus no basis for the assumption that D1 discloses ZSM-5 with a DRI above 25. The novelty objection on which the contested decision is based is therefore not founded.

3. Since not all the objections raised by the opponent have been dealt with in the contested decision, in particular not the inventive step objections, the Board considers it appropriate to use its power under Article 111(1) EPC to remit the case to the first instance for further prosecution, in accordance with the appellant's request.
4. Since further prosecution can be based on the claims according to the main request, there is no need to discuss the auxiliary request here.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is remitted to the opposition division for

further prosecution.

The Registrar:

The Chairman:

S. Hue

R. Spangenberg