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Datasheet for the decision of 23 May 2022

Case Number: T 0164/20 - 3.3.05

Application Number: 09835738.7

Publication Number: 2382031

IPC: B01D53/94, B01J29/76, F01N3/035, F02M35/024, B01J37/02, F01N3/20, F01N3/10, F01N13/00

Language of the proceedings: EN

Title of invention:
EMISSIONS TREATMENT SYSTEMS AND METHODS WITH CATALYZED SCR FILTER AND DOWNSTREAM SCR CATALYST

Patent Proprietor:
BASF Corporation

Opponent:
Umicore AG & Co. KG

Headword:
Emissions treatment/BASF

Relevant legal provisions:
RPBA 2020 Art. 13(2)
EPC Art. 56
EPC R. 103(4)(a)

Keyword:
Amendment after summons - exceptional circumstances (no) - cogent reasons (no)
Inventive step - (yes)

Decisions cited:
T 1904/16, T 2271/18

Catchword:

Europäisches Patentamt
European Patent Office
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Beschwerdekammern

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Case Number: T 0164/20 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 23 May 2022

Respondent: (Patent Proprietor)	BASF Corporation 100 Park Avenue Florham Park, NJ 07932 (US)
Representative:	Altmann Stößel Dick Patentanwälte PartG mbB Isartorplatz 1 80331 München (DE)
Appellant 2: (Opponent)	Umicore AG & Co. KG Rodenbacher Chaussee 4 63457 Hanau-Wolfgang (DE)
Representative:	Vossius & Partner Patentanwälte Rechtsanwälte mbB P.O. Box 86 07 67 81634 München (DE)
Decision under appeal:	**Interlocutory decision of the Opposition Division of the European Patent Office posted on 29 November 2019 concerning maintenance of the European Patent No. 2382031 in amended form.**

Composition of the Board:

Chairwoman	O. Loizou
Members:	G. Glod
	S. Besselmann

Summary of Facts and Submissions

I. The appeal of the opponent (appellant 2) lies from the opposition division's decision that European patent 2 382 031 in amended form on the basis of auxiliary request 7 met the requirements of the EPC. The patent proprietor (originally appellant 1, now the respondent) also filed an appeal which was withdrawn during oral proceedings.

II. Claim 1 of auxiliary request 7 corresponds to claim 7 of the patent as granted and reads as follows:

"*1. A method for treating an engine exhaust gas stream having an initial NO_x concentration and effective for conversion of NO_x, comprising:*
defining an exhaust gas system operational window based on a minimum targeted system NO_x conversion and a maximum targeted percentage increase in system back pressure, the percentage increase in system back pressure based on a comparison of system back pressure associated with a filter not loaded with catalyst to a system with a filter loaded with catalyst;
passing the gas stream through a particulate filter disposed downstream of the engine, the particulate filter loaded with a first SCR catalyst effective for NO_x conversion, the gas stream having an intermediate NO_x concentration after passing through the particulate filter, wherein there is no intervening SCR catalyst between the particulate filter and the engine, the exhaust gas stream containing a reductant comprising one or more of hydrocarbons, ammonia, urea and ammonia precursors; and

passing the gas stream having the intermediate NO_x concentration through a second substrate loaded with a second SCR catalyst disposed downstream of the particulate filter effective for NO_x conversion,
wherein the gas stream exiting the emissions treatment system has a final NO_x concentration, and wherein the system NO_x conversion and the system back pressure are within the operational window,
wherein the second substrate is a flow through substrate,
wherein the particulate filter is a honeycomb wall flow filter which has a porosity in the range of 50% and 80% and has a loading of the SCR catalyst in the range of 6.1 g/l (0.1 g/in^3) and 109.0 g/l (1.8 g/in^3), wherein the first SCR catalyst is located within the walls of the particulate filter and
wherein the first SCR catalyst and the second SCR catalyst are different, the first SCR catalyst being operable for NO_x conversion at higher gas stream temperatures and the second SCR catalyst being operable for NO_x conversion at lower gas stream temperatures, wherein the second SCR catalyst comprises a zeolite containing Cu and having the CHA structure."

Claim 2 relates to a preferred embodiment.

III. The following documents used in the impugned decision are cited here:

D1: WO 2009/099937 A1
D2: US 7 229 597 B2
D3: WO 2008/106519 A1
D5: WO 2008/106518 A2
D6: WO 2008/106523 A2
D7: WO 2007/145548 A1

IV. Oral proceedings took place on 23 May 2022.

V. Appellant 2's arguments relevant to the present decision can be summarised as follows.

Claim 1 lacked an inventive step over D7, D2 and any of D1, D3, D5 or D6. The aim of D7 was to provide an exhaust after treatment system enabling a high NO_x conversion factor.
D7, which represented the closest prior art, taught that different coatings could be applied on the upstream and downstream sides of the wall surfaces of the filter coated with SCR catalysts to obtain a catalyst having a wide temperature range. D7 did not expressly teach that different SCR catalytically active components could be used for the first and second catalysts. It was inherent that the first - upstream - catalyst was exposed to higher temperatures than the second - downstream - catalyst. As D7 did not specify the impairments caused by soot nor gave any details about catalyst loadings or the porosity of the wall flow filter, the skilled person had an incentive to look for documents providing these details.

The examples in the patent did not show any surprising effect. The objective technical problem was the provision of an alternative emissions treatment system which had adequate NO_x conversion and reduced back pressure.

D2 taught that the wall flow monolith should have a porosity of 50% to 75% and that it was loaded with SCR catalyst in an amount of larger than or equal to 1.3 g/in^3, preferably 1.6-2.4 g/in^3. The SCR catalyst permeated the walls. This meant that it was present in the walls. D2 furthermore disclosed that an additional

SCR catalyst might be located downstream of the filter coated with an SCR catalyst. It also dealt with the problem of achieving acceptable back pressure.

Using a downstream SCR catalyst comprising a Cu-loaded CHA was disclosed in D1, D5, D3 and D6.

Claim 1 also lacked novelty in view of D3 which incorporated by reference D2. It lacked an inventive step in view of D3 in combination with D2 and in view of D7 in combination with D3.

VI. The respondent's arguments are reflected in the reasoning below.

VII. Appellant 2 (opponent) requested that the impugned decision be set aside and that the patent be revoked.

The respondent (patent proprietor) requested that the appeal of appellant 2 be dismissed.

Reasons for the Decision

Auxiliary request 7 (found allowable by the opposition division)

1. Article 13(2) RPBA 2020

After summons to oral proceedings had been notified, in a reply to the communication pursuant to Article 15(1) RPBA 2020, appellant 2 made further submissions on 22 April 2022 and 16 May 2022. The first letter included inventive-step objections starting from D3 as the closest prior art and starting from D7 in combination with D3. In addition, the novelty of claim 1 was

contested in view of D3 with the teaching of D2 being incorporated by reference.

In the grounds of appeal, no novelty objection was raised against claim 1 of the current request. The only substantiated inventive-step objection by appellant 2 in the grounds of appeal and the reply to the respondent's (then appellant 1's) grounds of appeal was based on D7 as the closest prior art in combination with D2. D3 was only mentioned as a possible additional document (see page 7 of appellant 2's grounds of appeal, line 3), forming part of a three-document combination.

In accordance with Article 13(2) RPBA 2020, which applies in the current case, any amendment to a party's appeal case made after notification of a summons to oral proceedings shall in principle, not be taken into account unless there are exceptional circumstances which have been justified with cogent reasons by the party concerned.

In the case at hand, the novelty and inventive-step objections based on D3 as the closest prior art and starting from D7 in combination with D3 are considered to constitute an amendment to appellant 2's appeal case since they were not raised previously during appeal proceedings and cannot be considered part of appellant 2's complete appeal case as set out in Article 12(3) RPBA 2020.

Appellant 2 has not provided any reasons to justify their submission at this stage of the proceedings, and the board cannot recognise any either.

Although D3 was used against novelty and D7 was cited

in combination with D3 in opposition proceedings, these objections were not further pursued at the appeal stage with the statement of grounds of appeal or the reply, and their reintroduction is thus limited by Article 13(2) RPBA 2020.

Neither can amendments submitted in response to a preliminary opinion of the board give rise to "exceptional circumstances" within the meaning of Article 13(2) RPBA 2020 (T 2271/18, Reasons 3.3) because the clear and detailed preliminary opinion provided by a board is predominantly intended to give the parties an opportunity to thoroughly prepare their arguments in response to it but not to file new submissions.

Therefore, the new novelty and inventive-step objections based on D3 as the closest prior art and based on the combination of D7 and D3 are not taken into account.

2. Article 56 EPC

2.1 The invention relates to a method for treating an engine exhaust gas stream containing NO_x.

2.2 D7 relates to the same general purpose of treating an exhaust stream containing NO_x. It is the closest prior art to be taken into account in the appeal proceedings and is used by appellant 2. D7 discloses a catalyst system comprising a first catalyst 200, a second catalyst 300 and an exhaust pressure governor 400. First and second reductant injectors 210 and 310 for reductants such as urea are mounted upstream of the first catalyst 200 and upstream of the second catalyst 300, respectively (Figure 1). The first catalyst is a

wall flow filter (page 5, line 30 to page 6, line 4). Both catalysts are SCR catalysts (page 5, lines 17 and 18). Although it may be implicit that the first SCR catalyst is operable for NO_x conversion at higher gas stream temperatures and the second SCR catalyst is operable for NO_x conversion at lower gas stream temperatures, there is no disclosure that the first and the second SCR catalysts are different. The same catalyst could be operated at different temperatures.

2.3 The problem to be solved by the current invention is to provide acceptable back-pressure increase and NO_x removal (paragraph [0010]).

2.4 The problem is solved by a method according to claim 1 characterised in that the wall flow filter has a porosity in the range of 50% and 80% and a loading of the SCR catalyst in the range of 6.1 g/l (0.1 g/in^3) and 109.0 g/l (1.8 g/in^3), where the first SCR catalyst is located within the walls of the particulate filter, the first and second SCR catalysts are different, and the second SCR catalyst comprises a zeolite containing Cu and having the CHA structure.

2.5 In view of the examples in the patent and the lack of counter-evidence, it is accepted that the problem posed is solved. It is evident from Figures 4 to 6 that back-pressure increase and NO_x removal is not the same for all catalyst loadings falling within the scope of claim 1 and that there is an optimal zone. However, it is also apparent that NO_x conversion and back-pressure increase are still acceptable outside this optimum and inside the range claimed (6.1 g/l (0.1 g/in^3) and 109.0 g/l (1.8 g/in^3)). Data for the lower part of that range are missing, but there are also no data that would indicate that no NO_x conversion is taking place any

more around the lower end point of the range (6.1 g/l (0.1 g/in^3)). To summarise, it is accepted that some variation in the increase of back pressure and NO_x conversion is present depending on the catalyst load, but there is no evidence that would allow concluding that the posed problem is not solved and that similar results would be obtained with a system according to D7.

2.6 The proposed solution is not obvious in view of the prior art.

2.6.1 D7 is silent about managing back pressure. Although it discloses the possibility of using different SCR coatings on the upstream and downstream sides of the wall surfaces of the wall flow filter, it does not link this to back pressure. In addition, it does not relate to catalyst loading within the walls. As indicated above, the porosity of the filter and catalyst loadings are not a subject of D7.

2.6.2 In light of the above, it is doubtful whether the skilled person trying to solve the posed problem would turn to D2 since D2 relates to a wall flow monolith comprising an SCR catalyst composition that permeates the wall (claim 1, column 5, lines 17 to 20).

But even if it were accepted that the skilled person trying to solve the posed problem would turn to D2, the skilled person would not be guided towards a catalyst loading in the claimed range. With respect to the back pressure, D2 discloses catalysts A1 and A2 with loadings of 2.1 g/in^3 which permeate the wall. The catalyst was Cu-BEA. Although D2 teaches loadings of at least 1.3 g/in^3, the preferred range starting at 1.6 g/in^3, such loadings are not exemplified. There is

no reason why the skilled person would not turn to the example, which is described as optimised (column 13, lines 19 to 26). In light of this example and the general aim of D2 (column 2, lines 53 to 65), namely that coating techniques allowing *higher* catalyst loadings yet achieving acceptable back pressures are desirable, D2 would not have prompted the skilled person to select a catalyst loading near the low part of the range disclosed in D2 for carrying out the teaching of D7. Furthermore, D2 does not explicitly teach having two different catalysts. The disclosure (column 3, lines 1 to 17) that the SCR catalyst compositions preferably have a wide enough operating temperature range does not imply that different catalysts should be used. Nor does this derive from the general possibility of having additional SCR catalysts downstream of the soot filter (column 7, lines 20 to 22). D2 is silent about a zeolite having a CHA structure. As is clear from the above, even if D7 and D2 were combined, their combination would not result in the subject-matter of claim 1.

It is not apparent to the board in view of appellant 2's mere reference to the notice of opposition why the skilled person would additionally turn to D1, D3, D5 or D6. These documents were cited to establish that selecting a downstream Cu-CHA SCR catalyst would have been obvious. However, as follows from the above, even if the skilled person were to consult a further document and were to be prompted to use a Cu-CHA zeolite, this modification alone would still not result in the subject-matter of claim 1, i.e. the SCR catalyst loading of the particulate filter. At least in this respect, appellant 2's argument is based on hindsight.

In addition, D1 is irrelevant since it has not been shown to be prior art under Article 54(2) EPC for the claims under consideration.

2.6.3 Therefore, the subject-matter of claim 1 and claim 2, which includes all the features of claim 1, involves an inventive step. The requirements of Article 56 are met.

3. Rule 103(4)(a) EPC

The respondent (previously appellant 1) withdrew its appeal during oral proceedings before the decision was announced so that the requirements for reimbursement of 25% of the appeal fee in accordance with Rule 103(4)(a) EPC are met.

Order

For these reasons it is decided that:

1. The appeal of appellant 2 is dismissed.

2. The appeal fee of the respondent (appellant 1) is reimbursed at 25%.

The Registrar: The Chairwoman:

C. Vodz O. Loizou

Decision electronically authenticated