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Datasheet for the decision of 27 March 2012

Case Number: T 0089/10 - 3.3.06

Application Number: 02252199.1

Publication Number: 1245266

IPC: B01D 53/04, B01J 20/18

Language of the proceedings: EN

Title of invention:
Process for reducing the level of carbon dioxide in a gaseous mixture

Patentee:
AIR PRODUCTS AND CHEMICALS, INC.

Opponent:
PRAXAIR TECHNOLOGY, INC.

Headword:
Reducing the carbon dioxide level/AIR PRODUCTS

Relevant legal provisions:
EPC Art. 108, 123(2)
EPC R. 99(b)

Relevant legal provisions (EPC 1973):
EPC Art. 54(1)(2), 56, 83

Keyword:
"Admissibility of the appeal (yes)"
"Added subject-matter (claim 13 of the main request and of the first and second auxiliary requests): yes"
"Sufficiency of disclosure: yes - no convincing evidence submitted supporting the alleged insufficiency"
"Novelty (third auxiliary request): yes"
"Inventive step (third auxiliary request): yes - not obvious to try with the expectation of solving the technical problem underlying the invention"

Decisions cited:
T 0349/09

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0089/10 - 3.3.06

D E C I S I O N
of the Technical Board of Appeal 3.3.06
of 27 March 2012

Appellant: (Opponent)
PRAXAIR TECHNOLOGY, INC.
39 Old Ridgebury Road
Danbury, CT 06810-5113 (US)

Representative:
Schorer, Reinhard
Schwan Schwan Schorer
Patentanwälte
Bauerstrasse 22
D-80796 München (DE)

Respondent: (Patent Proprietor)
AIR PRODUCTS AND CHEMICALS, INC.
7201 Hamilton Boulevard
Allentown, PA 18195-1501 (US)

Representative:
Smart, Peter John
Beck Greener
Fulwood House
12 Fulwood Place
London WC1V 6HR (GB)

Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office posted 1 December 2009 concerning maintenance of European patent No. 1245266 in amended form.**

Composition of the Board:

Chairman: P.-P. Bracke
Members: L. Li Voti
J. Geschwind

Summary of Facts and Submissions

I. The present appeal is from the decision of the Opposition Division to maintain the European patent no. 1 245 266, concerning a process for reducing the level of carbon dioxide in a gaseous mixture, in amended form.

II. In its notice of opposition the Opponent sought the revocation of the patent on the grounds of Article 100(a) EPC, because of lack of novelty and inventive step of the claimed subject-matter, and of Article 100(b) EPC.

The following documents were cited *inter alia* during opposition:

(2): WO 99/05063,
(5): US-A-3906076,
(7): WO-99/43416,
(11): US-A-5531808,
(13): EP-A-992274,
(23): "Adiabatic Adsorption of Bulk Binary Gas Mixtures: Analysis by Constant Pattern Model" by S. Sircar and R. Kumar, Ind. Eng. Chem. Process Des. Dev., vol. 22, no. 2 (1983), pages 271 to 280, and
(27): EP-A-862938.

III. The Opposition Division found in its decision that the amended claims according to the second auxiliary request submitted during oral proceedings complied with all the requirements of the EPC.

IV. An appeal was filed against this decision by the Opponent (Appellant).

With the letter of 20 August 2010 the Respondent (Patent Proprietor) submitted three sets of 13 claims as main request and first and second auxiliary request, respectively, the set of claims according to the first auxiliary request corresponding to the claims found by the Opposition Division to comply with the requirements of the EPC.

With the letter of 27 February 2012 the Appellant submitted additional arguments and documents, in particular documents (2), (11) and (29): US-A-4603040, in support of its objections as to sufficiency of disclosure.

Oral proceedings were held before the Board on 27 March 2012. During oral proceedings the Respondent submitted two amended sets of claims as third and fourth auxiliary request, respectively.

V. The independent claims 1 and 5 according to the **main request** read as follows:

"1. A process for the reduction of the level of carbon dioxide in a gaseous mixture comprising carbon dioxide and at least one other gaseous component wherein the level of carbon dioxide in the gaseous mixture is less than 1000 ppm which comprises contacting the gaseous mixture and binderless Na X-type zeolite having a particle size of at least 2 mm and not more than 4 mm, a silicon to aluminium ratio of at least 1.2 and in which at least 90% of the exchangeable cations are sodium, wherein the binderless zeolite is obtainable by producing a zeolite comprising a binder and converting

the binder into zeolite so as to reduce the level of binder whereby a first ratio taken between the adsorption capacity for carbon dioxide of the binderless zeolite to the adsorption capacity of the zeolite comprising a binder prior to the reduction of the level of the binder is greater than a second ratio taken between the level of zeolite in the binderless zeolite by weight percent to the level of zeolite in the zeolite with binder prior to reducing the level of the binder."

"5. A process for the reduction of the level of N_2O present as a trace impurity in air which comprises contacting the air and binderless Na X-type zeolite having a particle size of at least 2 mm and not more than 4 mm, a silicon to aluminium ratio of at least 1.2 and in which at least 90% of the exchangeable cations are sodium, wherein the binderless zeolite is obtainable by producing a zeolite comprising a binder and converting the binder into zeolite so as to reduce the level of binder whereby a first ratio taken between the adsorption capacity for N_2O of the binderless zeolite to the adsorption capacity of the zeolite comprising a binder prior to the reduction of the level of the binder is greater than a second ratio taken between the level of zeolite in the binderless zeolite by weight percent to the level of zeolite in the zeolite with binder prior to reducing the level of the binder."

Furthermore, claim 13 according to the main request has the following wording:

"13. A process for the reduction of the level of carbon dioxide in a gaseous feed mixture comprising carbon dioxide and at least one other gaseous component which comprises upgrading a plant for removing carbon dioxide and water from the gaseous feed mixture by replacing a first adsorbent in a bed in an adsorber, wherein said first adsorbent is a 13X zeolite comprising a binder, with a replacement adsorbent having a larger particle size, which is a binderless X-type zeolite having a silicon to aluminium ratio of at least 1.2 and in which at least 90% of the exchangeable cations are sodium without increasing the size of the bed, and contacting the gaseous mixture with the replacement adsorbent according to the process claimed in Claim 1."

The dependent claims 2 to 4 and 6 to 12 of the main request refer to particular embodiments of the process according to claim 1 and/or that of claim 5.

The **first auxiliary request** differs from the main request only insofar as the wording of claim 13 does not contain the word "by" between "...from the gaseous feed mixture" and "replacing a first adsorbent..." and comprises the wording "increasing the size of the adsorbent" instead of "increasing the size of the bed".

The **second auxiliary request** differs from the main request only insofar as both claims 1 and 5 contain the initial wording "A thermal swing adsorption process for..." instead of "A process for...".

The **third auxiliary request** differs from the main request only insofar as it does not contain any longer claim 13.

The **fourth auxiliary request** differs from the second auxiliary request only insofar as it does not contain any longer claim 13.

VI. The Appellant submitted *inter alia* that

- the patent in suit did not disclose how to prepare the binderless Na X-type zeolites of the invention having a silicon to aluminium ratio of at least 1.2 and the required adsorption capacity for carbon dioxide and nitrous oxide recited in claims 1 and 5, respectively (hereinafter referred to as superproportional capacity), by producing a zeolite comprising a binder and converting the binder into zeolite; moreover, the prior art, e.g. documents (2) and (29), showed that a kaolin-type binder contained in a zeolite X was converted by caustic digestion into an LSX zeolite, i.e. a zeolite having better adsorption properties for carbon dioxide than a zeolite NaX, as taught in document (11), but having a silicon to aluminium ratio below 1.2 and, therefore, not being encompassed by claims 1 and 5 of the main request; consequently, it was not credible that the superproportional capacity was an inherent property of any binderless NaX zeolite and that the binderless NaX zeolites suitable for the invention could be prepared by simply converting the binder contained in the precursor NaX zeolite to the same zeolite;

- since it was necessary to select a specific binder in the precursor and a specific method of conversion in order to obtain a binderless NaX zeolite having such a superproportional capacity and the patent in suit did

not disclose any teaching in this respect, the invention was not sufficiently disclosed;

- the claimed subject-matter lacked novelty over document (7) or an inventive step over the cited prior art, in particular over the combination of documents (13), (5) and, if necessary, (27), taking into account, alternatively, also the teaching of documents (2) and (11).

VII. The Board submitted during oral proceedings that the wording of each claim 13 according to the main request and the first and second auxiliary requests, which claims were modified versions of claim 16 as granted, appeared not to be supported by the original documents of the application and would thus appear to contravene the requirements of Article 123(2) EPC.

VIII. The Respondent submitted in writing that

- the appeal was inadmissible since the statement of the grounds of appeal repeated almost identically the arguments already submitted in writing before the department of first instance and the additional section 6 did not explain why the decision under appeal was wrong; therefore, the legal situation was similar to that of case T 349/09 and the appeal had to be considered inadmissible on similar grounds;

- each claim 13 according to the main request and the first and second auxiliary request complied with the requirements of Article 123(2) EPC since the teaching of paragraph 17 of the original application documents was generically applicable to the invention and could

be combined with the information of paragraph 53, relating to example 5;

- the superproportional capacity was an inherent feature of the binderless NaX zeolites used according to claims 1 and 5; since the preparation of such binderless zeolites was known to the skilled person at the priority date of the patent in suit, the invention was sufficiently disclosed;

- document (7) did not disclose clearly and unambiguously the claimed subject-matter;

- the skilled person would not have combined the teaching of document (13) with that of document (5) since they related to the solution of different technical problems; however, even though the skilled person could have envisaged to combine these teachings, he would not have done it with the expectation of obtaining the unexpected superproportional capacity shown in the patent in suit, which superproportional capacity was such to allow the use of zeolite particles of greater size and of higher gas feed flow rate, thereby achieving an increased plant productivity without requiring a longer mass transfer zone length and without disadvantageous fluidization of the adsorbent bed; therefore, the claimed subject-matter involved an inventive step over the cited prior art.

IX. The Appellant requests that the decision under appeal be set aside and the patent be revoked.

X. The Respondent requests that the patent be maintained on the basis of the main request submitted with letter

of 20 August 2010, or, in the alternative, on the basis of any of the first or second auxiliary requests, submitted with the same letter, or on the basis of the third or fourth auxiliary requests filed during oral proceedings.

Reasons for the Decision

1. *Admissibility of the appeal*

It is not contested that the greatest part of section 4 (and also of section 3) of the statement of the grounds of appeal repeats exactly the arguments of the last letter submitted by the Opponent in advance of the oral proceedings before the Opposition Division, with the exception of some slight adaptation of the text to the subject-matter of the claims found to comply with the requirements of the EPC in the decision under appeal. However, the statement of the grounds of appeal contains also an introduction (section 1) analysing specifically the subject-matter of the patent as maintained by the Opposition Division and a section 6 addressing specifically the reasoning of the decision under appeal and referring back to the arguments presented in section 4 (see last paragraph in section 6.2).

Therefore, it is clear from the statement of the grounds of appeal that, according to the Appellant's opinion, all these objections already raised before the Opposition Division still apply to the claims allowed by the Opposition Division and form part of the Appellant's case.

The fact that great part of these objections are copied from one submission filed during the first instance proceedings does not detract from the alleged validity of these arguments, which are implemented by specific sections (1 and 6) addressing the claims as maintained by the Opposition Division and parts of the decision under appeal. Therefore, the Board finds that the objections forming the appeal case are clear and fully understandable by reading the statement of the grounds of appeal.

The present case thus is different from the case T 349/09, invoked by the Respondent, in which the statement of grounds of appeal was prepared by simple editing of the earlier notice of opposition so as, for example, to refer to claims numbered as in the request allowed by the Opposition Division, and in which the Opponent repeated exactly entirely its statement of opposition and it was not possible to elicit from the submitted text which objections could still apply to the maintained claims without an extensive work of comparison (see points 1, 4, 8, 10 and 13 of the reasons).

Therefore, the Board concludes that the appeal complies with the requirements of Article 108 and Rule 99(b) EPC and is admissible.

2. *Compliance with Article 123(2) EPC of claim 13 according to the Respondent's main request*

Claim 13 relates to a process comprising the steps of upgrading a plant for removing carbon dioxide and water

by replacing an adsorbent bed of 13X zeolite with an adsorbent bed of binderless NaX zeolite.

The original documents of the application do not contain any claim which concerns the upgrading of a plant for removing carbon dioxide and water. However, the description recites such an upgrading in paragraph 17 reading:

"However, it has been found that, for the same or longer mass transfer zone length as compared to that used in a conventional process, the higher adsorption capacity of binderless zeolite allows a higher flow of feed stock without the need to change the process cycle time. A plant for removing carbon dioxide and water from a feed mixture, for example air, may be upgraded to have an increased throughput by replacing conventional adsorbent with a binderless zeolite without increasing the volume of adsorbent and hence the size of the bed in the plant."

Therefore, this paragraph reports the upgrading of a plant for removing carbon dioxide and water involving the replacement of a conventional adsorbent with a binderless zeolite as a possible application of the invention; furthermore, the description of the original application explains in paragraphs 18 and 23 to 25 that the binderless zeolite of the invention can be a binderless X-type zeolite having a particle size of at least 2 mm and not more than 4 mm as well as a silicon to aluminium ratio of at least 1.2, wherein at least 90% of the exchangeable cations are sodium, i.e. a binderless NaX zeolite of the type required in claim 13.

However, the example of application of the invention of paragraph 17 does not relate specifically to the replacement of an adsorbent bed of 13X zeolite with an adsorbent bed of binderless NaX zeolite as recited in claim 13.

Paragraph 53 of the original application, relating to example 5, discloses that a bound 13X zeolite can be replaced with a binderless 13X zeolite having a larger particle diameter; in this example, the specific diameter of the binderless zeolite is of 3.2 mm and a range of possible particle size is not indicated. Moreover, said paragraph 53 concerns the replacement of a bound 13X zeolite of smaller particle size, a step which is more limited than that specifically required by claim 13 and by the example of paragraph 17 of the description. Furthermore, example 5 concerns some tests for assessing the CO_2 breakthrough in a laboratory column and does not concern explicitly the upgrading of a plant for removing carbon dioxide and water. Therefore, in the Board's view, there is no explicit link between the replacement step suggested in paragraph 53 and the specific example of application of the invention of paragraph 17.

The Board concludes that there is no clear and unambiguous disclosure in the original application documents of the replacement of an adsorbent bed of zeolite 13X bed with an adsorbent bed of binderless NaX zeolite having the selected particle size range in the upgrading of a plant for the removal of carbon dioxide and water.

Therefore, claim 13 according to the main request does not comply with the requirements of Article 123(2) EPC.

3. *Compliance with Article 123(2) EPC of claim 13 according to Respondent's first and second auxiliary requests*

3.1 Claim 13 according to the first auxiliary request differs from that according to the main request only insofar as its wording does not contain the word "by" between "...from the gaseous feed mixture" and "replacing a first adsorbent..." and comprises the wording "increasing the size of the adsorbent" instead of "increasing the size of the bed"; the wording of claim 13 according to the second auxiliary request is instead identical to that of claim 13 according to the main request.

Therefore, the wording not complying with the requirements of Article 123(2) EPC discussed in paragraph 2 above is still contained in both claims.

3.2 Hence, for the same reasons exposed above, both claims 13 according to the first and second auxiliary requests do not comply with the requirements of Article 123(2) EPC.

4. Respondent's third auxiliary request

4.1 *Admissibility*

This request was submitted by the Respondent as a reaction to the objections under Article 123(2) EPC raised by the Board during the oral proceedings.

Therefore, this request is admissible.

The admissibility of this request was not contested by the Appellant.

4.2 *Article 123(2) EPC*

This request differs from the main request only insofar as it does not contain any longer claim 13.

It is undisputed that claims 1 to 12 comply with the requirements of Articles 123(2) and (3) EPC.

4.3 *Sufficiency of disclosure*

4.3.1 The Respondent confirmed during oral proceedings that the superproportional capacity is an inherent property of a binderless NaX-type zeolite having a silicon to aluminium ratio of at least 1.2 and in which at least 90% of the exchangeable cations are sodium.

In the Board's view this statement is in agreement with the description of the patent in suit, which does not require any specific method of preparation for such binderless zeolites, indicates a suitable commercially available product in paragraph 25, discusses prior art documents disclosing the preparation of binderless zeolites (paragraphs 7, 10 and 11) and states that it has been found that binderless zeolites, i.e. already known compounds, have said superproportional capacity (paragraph 12).

The Board has no reason to doubt the Respondent's and patent's statement in the absence of convincing evidence to the contrary. The burden of proof lies in this respect on the Appellant.

4.3.2 The Appellant did not submit any possible evidence for its allegation that the invention was not sufficiently disclosed till a very late stage of the proceedings. It was in fact with its letter of 27 February 2012 that it submitted a line of arguments and some patent documents (see point V above) in support of its allegation that the invention is not sufficiently disclosed.

The Board remarks that the cited documents do not concern the preparation of a binderless NaX zeolite, i.e. a zeolite having a ratio of silicon to aluminium ratio of at least 1.2 but a binderless LSX, a zeolite having a ratio of silicon to aluminium ratio of less than 1.2 (see document (2), claim 1 and page 2, lines 28 to 31; and document (29), column 1, lines 7 to 9 and column 3, lines 20 to 32). Therefore, even if the content of such late filed documents and submissions, the admissibility of which was in fact contested by the Respondent during oral proceedings, would be considered, it could not be used as evidence that the conversion of a binder bonded NaX zeolite into a binderless one would not result necessarily in a product having such a superproportional capacity as required in the present invention.

4.3.3 Therefore, in the absence of any convincing contrary evidence, the Board concludes that the invention is sufficiently disclosed.

4.4 *Novelty*

Claim 1 of document (7) concerns a process for the separation of nitrogen from a gas mixture by means of an adsorbent selective for nitrogen, wherein the adsorbent can be a NaX zeolite having specific mass transfer coefficient for nitrogen and specific intrinsic diffusivity. According to dependent claim 16 of this document, the average particle size of the adsorbent material used according to claim 1 can be from 1 to 2 mm.

However, the claims of document (7) do not relate specifically to the reduction of the level of CO_2 or N_2O in a gas mixture, do not specify that the zeolite has to be binderless and do not specify the amount of exchangeable sites occupied by Na ions.

Moreover, the description of this document teaches that said specific intrinsic diffusivity can be obtained by specific formulation and/or processing of the adsorbent, caustic digestion and variation of the binder content being only some of the possible methods to be applied (see page 20, line 20 to 28).

Furthermore, even though the disclosed invention can be applied to the reduction of the carbon dioxide content in a gas mixture (see page 15, lines 1 to 5 and page 37, lines 17 to 20), binderless NaX zeolites are not specifically indicated as the zeolites to be used for adsorbing carbon dioxide (see page 15, lines 5 to 11) and the specific examples contained on pages 28 to 36 of the description concern a different zeolite, which is a LiX(2.0) zeolite.

The Board thus concludes that document (7) does not disclose all the features of claim 1 or 5 in combination and does not contain a clear and unambiguous disclosure of the claimed subject-matter.

Therefore, the claimed subject-matter is novel.

4.5 *Inventive step*

4.5.1 The invention of claim 1 relates to a process for reducing the level of carbon dioxide or nitrous oxide in a gaseous mixture.

As explained in the description of the patent in suit, it was known to use zeolites like zeolite 13X in the selective removal of carbon dioxide from a gaseous mixture. The zeolites particles contain usually a binder, which is employed for improving the mechanical strength of the particles. However, since the binder does not contribute generally to the adsorption capacity of the zeolite and a given total mass of zeolite with binder has a lower volume or mass of actual zeolite available for adsorption, to achieve a given level of adsorption, a higher volume of zeolite with binder is required which requires a larger reactor and hence a consequential increase in capital and variable costs (see paragraphs 5 and 6).
The description remarks also that the prior art had already disclosed how to prepare binderless zeolites and had suggested to use them in some gas separation processes (see paragraphs 7, 10 and 11).

The patent in suit explains further that it was found that binderless zeolites exhibit higher capacity for adsorption of carbon dioxide and nitrous oxide than would be expected from a consideration of the adsorption capacity of a zeolite with binder and the expected increase in capacity if the binder were replaced by the same zeolite (paragraph 12).
As a consequence, the increased mass transfer rate for carbon dioxide and nitrous oxide allows a reduction in mass transfer zone length to achieve a given adsorption capacity. This surprising property may then be utilised according to the invention to obtain a higher process throughput by increasing the particle size of the adsorbent zeolite and the flow of the feed gaseous mixture without unacceptable fluidisation of the adsorption material (paragraphs 17 to 20).

Therefore, the technical problem underlying the present invention can be formulated, as suggested by the Respondent during oral proceedings, as the provision of an adsorbent which allows an increase of the throughput in a process for the reduction of carbon dioxide or nitrous oxide in a gaseous mixture.

4.5.2 Both parties chose document (13) as the most suitable starting point for the assessment of inventive step, since it relates to a process for reducing the amount of carbon dioxide and nitrous oxide from an air stream, i.e. from a gaseous mixture, and uses a conventional bound zeolite 13X for adsorbing carbon dioxide (see paragraphs 1, 16 and 42).

The Board thus takes also this document as starting point for the evaluation of inventive step.

Since document (13) deals mainly with the technical problem of providing an adsorbent which has a greater selectivity for nitrous oxide over carbon dioxide (paragraph 11) and, in fact, does not try to solve explicitly the technical problem indicated above, the technical problem underlying the present invention can be formulated as suggested by the Respondent and indicated above.

It was not contested that examples 1 to 3 of the patent in suit show that the selected type of binderless NaX zeolite of the invention exhibits higher adsorption capacity for carbon dioxide and nitrous oxide than it would be expected from a consideration of the adsorption capacity of a zeolite with binder and the expected increase in capacity if the binder were replaced by the same zeolite, i.e. that it shows a so-called superproportional capacity. Consequently, it has better mass transfer rate with respect to carbon dioxide and nitrous oxide and need a shorter mass transfer zone length in an adsorption process of the type of the invention. Both parties agreed that the fact that the specific zeolite X tested in these examples has a particle size of 1.7 mm, i.e. a value inferior to the lower limit for the NaX zeolite of claims 1 and 5, does not jeopardize the significance of the obtained results and that it has to be expected that similar zeolites with a greater particle size as required by the claims show also such a superproportional capacity.

According to example 4 of the patent in suit, a binderless NaX zeolite having a particle size of 3.2 mm,

i.e. a size within the limits of claims 1 and 5, compared with a bound zeolite 13X of 1.7 mm diameter, brings about an increase of the mass transfer zone which is much smaller than it would be expected by theoretical consideration, since it is known that at a given gas flow rate the length of the mass transfer zone is **proportional to the square of the particle size** (see equation 56 on page 276 of document (23)). In fact, even though the increase in particle size is of about 88%, the increase in mass transfer zone is of only 70%. Moreover, even though the mass transfer zone is longer and thus less selective, the relative time to carbon dioxide breakthrough is longer than that obtained by means of the bound 13X zeolite.

As explained in paragraph 51 of the patent in suit, following example 4, such results show that the unexpected superproportional capacity of the selected NaX zeolite is so great that it allows to increase the particle size with respect to that used for a bound zeolite X without the necessity of increasing the mass transfer zone; hence, it allows also the use of higher gas feed flow rates without causing the bed to become fluidised. Consequently, the use of such a binderless zeolite X allows the achievement of higher plant productivity.

The Board finds that the results of example 4, though not being a direct comparison of a binderless zeolite X with a bound 13X zeolite of the same particle size, show convincingly the unexpected effects brought about by the superproportional capacity for carbon dioxide of the selected binderless NaX zeolite. Therefore, the use of such a binderless zeolite allows to achieve all the

advantages mentioned in paragraph 51 and to solve the technical problem underlying the invention.

As example 3 shows that the selected binderless zeolite has a superproportional capacity also for nitrous oxide, there is no reason to assume that the same effects would not be achieved with respect to the adsorption of this gas. Furthermore, the Board has no reason to assume that similar effects would not be achieved within the claimed range of particle sizes of 2 to 4 mm.

Therefore, the Board finds that the technical problem underlying the invention identified above has been successfully solved by using the selected NaX binderless zeolite as adsorber.

4.5.3 It is undisputed that the process disclosed in document (13) differs from the subject-matter of claim 1 only insofar as it does not use a binderless zeolite of the type claimed.

It is also undisputed that document (5) discloses that a binderless zeolite X has a greater adsorption capacity for CO_2 than a bound zeolite X (column 2, lines 22 to 26; column 3, lines 36 to 44, column 4, lines 37 to 51). However, as already explained in paragraph 6 of the patent in suit, this result is not surprising since a particle of binderless zeolite X has more zeolite X adsorption material than a particle of bound zeolite X which still contain a greater amount of inert binder.

As regards the comparison shown in this document, the Board remarks that example 3 compares the zeolite X materials of examples 1 and 2, a binderless zeolite

derived from a zeolite X containing meta-kaolin clay and a bonded zeolite containing attapulgite clay, which two zeolites have very different particle size, one being of 16 to 40 mesh, i.e. about 0.4 to 1.19 mm and the other one of 4 to 8 mesh, i.e. about 2.38 to 4.76 mm. As a consequence of the different particle size, the conditions used in the experiment of example 3 are also not comparable, since both the packed density used for the zeolites of examples 1 and 2 and their surface area are different (see column 5, lines 14 and 15).

Therefore, even though it can be concluded from this experiment that a binderless zeolite X adsorbs more CO_2 than a bound zeolite X, it would not have been possible for the skilled person to recognise from this disclosure that the adsorption capacity of the binderless zeolite is much greater than it would be expected from a consideration of the adsorption capacity of a zeolite with binder and the expected increase in capacity if the binder were replaced by the same zeolite, i.e. that a binderless NaX zeolite has a superproportional capacity for CO_2 as found in the present invention.

For similar reasons there is no reason to assume that the skilled person, starting from the knowledge of document (5), would have expected that a binderless NaX zeolite could be used in form of greater particles without the need of increasing the mass transfer zone length as expected by theoretical considerations and that higher gas feed flows could be used without incurring in unacceptable fluidisation of the adsorption material.

The Board concludes, that even though the skilled person could have tried a known binderless zeolite X as replacement for the zeolite 13X used in document (13), he would not have done it with the expectation of achieving the technical improvement convincingly shown in the patent in suit, i.e. with the aim of solving the technical problem underlying the invention.

Therefore, the subject-matter of claim 1 involves an inventive step.

4.5.4 For the sake of completeness the Board remarks that during oral proceedings the Appellant submitted an additional line of argumentation based on its late submissions presented with regard to sufficiency of disclosure. However, as explained in point 4.3.2 above, this line of argumentation implies that at least part of the kaolin-type clay binder is transformed upon caustic digestion in a LSX zeolite, i.e. a zeolite having a silica to aluminium ratio of less than 1.2, which is known to have greater adsorptive capacity for carbon dioxide than zeolite 13X, as shown in the table in column 6 of document (11), but that it is not part of the subject-matter of claim 1 according to the third auxiliary request, which explicitly requires a silica to aluminium ratio of the chosen binderless NaX zeolite X of at least 1.2.

Therefore, even if this additional line of reasoning, the admissibility of which was also contested by the Respondent as being late filed, would be considered, it could not be considered to be a bar to the inventiveness of the claimed subject-matter discussed above.

4.5.5 As regards the subject-matter of claim 5 according to the third auxiliary request, the arguments submitted by the Appellant differ from the preceding ones only insofar as it comprise the additional citation of document (27), disclosing that zeolite NaX is a zeolite suitable for adsorbing also traces of nitrous oxide from a feed gas (see page 3, lines 35 to 38); therefore, the conclusions as to the inventiveness of the subject-matter of claim 1 apply *mutatis mutandis* to the subject-matter of claim 5.

The Board thus concludes that the subject-matters of claims 1 and 5, as well as those of the dependent claims 2 to 4 and 6 to 12, involve an inventive step.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to maintain the patent on the basis of the set of claims of the third auxiliary request and with a description to be adapted thereto.

The Registrar: The Chairman:

D. Magliano P.-P. Bracke

BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

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Datasheet for the decision of 27 March 2012

Case Number: T 0089/10 - 3.3.06

Application Number: 02252199.1

Publication Number: 1245266

IPC: B01D 53/04, B01J 20/18

Language of the proceedings: EN

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Patentee:
AIR PRODUCTS AND CHEMICALS, INC.

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PRAXAIR TECHNOLOGY, INC.

Headword:
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"Sufficiency of disclosure: yes - no convincing evidence submitted supporting the alleged insufficiency"
"Novelty (third auxiliary request): yes"
"Inventive step (third auxiliary request): yes - not obvious to try with the expectation of solving the technical problem underlying the invention"

Decisions cited:
T 0349/09

Catchword:
-

Europäisches Patentamt | European Patent Office | Office européen des brevets

Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0089/10 - 3.3.06

D E C I S I O N
of 23 May 2012
correcting an error in the decision
of the Technical Board of Appeal 3.3.06
of 27 March 2012

Appellant: (Opponent)
PRAXAIR TECHNOLOGY, INC.
39 Old Ridgebury Road
Danbury, CT 06810-5113 (US)

Representative:
Schorer, Reinhard
Schwan Schwan Schorer
Patentanwälte
Bauerstrasse 22
D-80796 München (DE)

Respondent: (Patent Proprietor)
AIR PRODUCTS AND CHEMICALS, INC.
7201 Hamilton Boulevard
Allentown, PA 18195-1501 (US)

Representative:
Smart, Peter John
Beck Greener
Fulwood House
12 Fulwood Place
London WC1V 6HR (GB)

Decision under appeal:
Interlocutory decision of the Opposition Division of the European Patent Office posted 1 December 2009 concerning maintenance of European patent No. 1245266 in amended form.

Composition of the Board:

Chairman: P.-P. Bracke
Members: L. Li Voti
J. Geschwind

In application of Rule 140 EPC (2000), the decision of the Technical Board of Appeal dated 27 March 2012 is hereby corrected as follows:

On page 9, third paragraph

the wording "Rule 99(b) EPC" is replaced by:

"Rule 99(2) EPC"

The Registrar: The Chairman:

D. Magliano P.-P. Bracke