

Internal distribution code:

- (A) [] Publication in OJ
(B) [] To Chairmen and Members
(C) [X] To Chairmen

D E C I S I O N
of 7 March 1995

Case Number: T 0547/92 - 3.3.2

Application Number: 84400525.6

Publication Number: 0119924

IPC: B01J 20/20

Language of the proceedings: EN

Title of invention:

Carbon molecular sieves and a process for their preparation and use

Patentee:

CALGON CARBON CORPORATION

Opponent:

The BOC Group plc
Bergwerksverband GmbH Patentabteilung

Headword:

Carbon molecular sieves/CALGON

Relevant legal provisions:

EPC Art. 54(2)

Keyword:

"Novelty (no)"

Decisions cited:

-

Catchword:

-



Case Number: T 0547/92 - 3.3.2

D E C I S I O N
of the Technical Board of Appeal 3.3.2
of 7 March 1995

Appellant:
(Opponent 01)

The Boc Group plc
Chertsey Road
Windlesham
Surrey GU20 6HJ (GB)

Representative:

Wickham, Michael
c/o Patent and Trademark Department
The BOC Group plc
Chertsey Road
Windlesham
Surrey GU20 6HJ (GB)

Other party:
(Opponent 02)

Bergwerksverband GmbH
Patentabteilung
Franz-Fischer-Weg 61
D-45307 Essen (DE)

Representative:

Respondent:
(Proprietor of the patent)

CALGON CARBON CORPORATION
400 Media Drive
Robinson Township
Pennsylvania 15205 (US)

Representative:

Warcoin, Jacques
Cabinet Régimbeau,
26, avenue Kléber
F-75116 Paris (FR)

Decision under appeal:

Decision of the Opposition Division of the
European Patent Office dated 6 April 1992
rejecting the opposition filed against European
patent No. 0 119 924 pursuant to Article 102(2)
EPC.

Composition of the Board:

Chairman: P. A. M. Lançon
Members: ()

Summary of Facts and Submissions

I. European patent No. 0 119 924 was granted in response to European patent application No. 84 400 525.6.

II. Notices of opposition were filed against the European patent by the Appellant (Opponent 01) and Opponent 02. Revocation of the patent was requested on the grounds of lack of novelty, lack of inventive step and insufficient disclosure. Opponent 02 withdrew its opposition before the contested decision was taken.

During the procedure before the Opposition Division 16 documents were cited. Of these documents only the following document remains important for this decision:

(4) Separation of nitrogen by air by PSA method - 48th convention of the Japanese Chemical Engineering Society, published on 5 March 1983 (original language Japanese) and its English translation.

III. The Opposition Division maintained the patent in amended form (auxiliary request II) with a main claim, which reads as follows:

"1. A carbon molecular sieve which is capable of separating gas or liquid mixtures containing components of at least two different molecular diameters, molecular weights or molecular shapes, said molecular sieve selected from the group consisting of molecular sieves having an average effective pore diameter of from about 0,3 (3) to about 2 nm (20 Angstroms) and having:

- (a) (i) an oxygen diffusivity of 500×10^{-8} to 750×10^{-8} cm^2/sec ,
and

- (ii) a diffusivity ratio of oxygen to nitrogen of 15 to 75;
- (b) (i) an oxygen diffusivity of 600×10^{-8} cm²/sec or less,
and
(ii) a diffusivity ratio of oxygen to nitrogen greater than 100;
and
- (c) (i) an oxygen diffusivity greater than 800×10^{-8} cm²/sec,
and
(ii) a diffusivity ratio of oxygen to nitrogen greater than 8,5.

With respect to novelty it was held that the values of oxygen diffusivity and the diffusivity ratio of oxygen to nitrogen were the distinguishing features (paragraph 12 of the reasons).

IV. The Appellant (Opponent 01) lodged an appeal against this decision and requested oral proceedings should the appeal be disallowed.

In the Statement of Grounds, it was argued that the amended claims as allowed by the Opposition Division lacked novelty and an inventive step (Articles 54 and 56 EPC) and that the disclosure of the invention was not sufficiently clear and complete to be carried out by a person skilled in the art (Article 83 EPC).

With respect to lack of novelty it was inter alia argued that (4) disclosed a carbon molecular sieve for use in separating air, which would inherently imply that it has

an average effective pore diameter in the range of 0.3 to 2 nm. From Figure 4 of (4) it was calculated, using the Formula on page 7 of the patent in suit, that the oxygen diffusivity was in the range of 970 to $1210 \cdot 10^{-8}$ cm²/s and that the diffusivity ratio of oxygen to nitrogen was between 25 ± 9 and 135 ± 45 . Thus all the features of Claim 1(c) were anticipated by (4).

- V. The Respondent disagreed with these submissions and expressed with respect to the novelty objection based on (4) the opinion that the calculations made by the Appellant were based upon assumptions for which no support was offered, in particular no support was provided for the argument that the loading at 180 seconds is at equilibrium.
- VI. After the summons to oral proceedings, scheduled for 7 March 1995, the Appellant submitted further arguments to support the objection of insufficient disclosure.
- VII. The Respondent stated in a letter dated 3 February 1995 that he did not wish to continue with the appeal proceedings and that he would not attend the oral proceedings. He maintained, however, that Appellant's position was not correct and that the appeal be rejected.
- VIII. According to the Notice of Appeal, only that part of the decision was appealed in which it was decided to maintain the patent in the form according to auxiliary request II). In the Statement of Grounds reasons were given against the maintenance of all the claims set out in the auxiliary request II and it was requested that grant of the patent be refused. This request can only be interpreted as a request that the decision under appeal be set aside and that the patent be revoked.

Reasons for the Decision

1. *Admissibility*

The appeal is admissible

2. *Allowability of the amendments*

Present Claim 1 has been limited with respect to Claim 1 as granted by replacing condition (a) with the more restrictive requirement of granted Claim 2 which is identical to Claim 2 as originally filed. Thus present Claim 1 satisfies the requirements of Article 123 EPC. The amendment has not introduced any unclarity.

3. *Novelty*

- 3.1 Document (4) relates to the separation of nitrogen from air by adsorption on carbon molecular sieves (MSC). Test results of a newly developed MSC were disclosed in Figures 3 and 4. From the fact that said prior art MSC was suitable for the separation of nitrogen from air the Appellant concluded that the molecular sieve inherently has an average effective pore diameter in the range of 0.3 to 2 nm.

According to paragraph 5 of the reasons of the contested decision the Respondent admitted during oral proceedings before the first instance that the effective pore size is not a limiting feature. Since the finding of the Appellant with respect to the average effective pore diameter was not refuted by the Respondent, the Board accepts that the MSC tested in (4) has an effective average pore diameter within the range of present Claim 1.

3.2 In the graph represented by Figure 4 of (4), the loading after 30 s and 180 s for both oxygen and nitrogen are indicated. From the graphs it further appears that the saturation loading for oxygen is not substantially higher than the loading at 180 s. For nitrogen the saturation loading cannot be derived with any accuracy from the graph but is certainly higher than the loading at 180 s. Taking as minimum for the saturation loading for nitrogen the loading at 180 s, the Appellant has calculated with the formula given on page 7 of the specification of the patent in suit, the oxygen diffusivity and the diffusivity ratio of oxygen to nitrogen. The oxygen diffusivity of said prior art MSC was calculated to be $1090 \pm 120 \cdot 10^{-8} \text{cm}^2/\text{s}$ and the diffusivity ratio of oxygen to nitrogen was calculated to be at least 25 ± 9 (Appendix I of the grounds).

The calculation as such was not contested by the Respondent but the assumptions on which the calculation was based were refuted. In particular it was argued, in agreement with the position taken by the Opposition Division as indicated in paragraph 6 of the reasons of the contested decision, that there was no support for the argument that the nitrogen loading at 180 s is at equilibrium (Respondent's reply of the grounds of appeal, page 2).

The Board admits that for nitrogen the loading at 180 s is not complete, or in other words is not at equilibrium. The saturation loading, however, can only be larger than the loading at 180 s. If the real saturation loading is higher, the ratio between the loading at 30 s and the saturation loading becomes lower. If said ratio is high (a maximum of 1 if the saturation loading is already reached in 30 s), the diffusivity is high. Thus if the saturation loading for nitrogen is higher than the loading at 180 s, the

diffusivity for nitrogen must be lower, which means that the diffusivity ratio of oxygen to nitrogen becomes higher. Thus the above mentioned calculated diffusivity ratio of at least 16 (25 - 9) is in fact lower than the actual ratio for said prior art MSC.

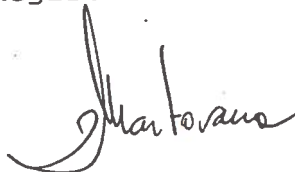
- 3.3 Thus the Board can only conclude that the carbon molecular sieve disclosed in (4), satisfies all the requirements of present Claim 1(c) so that the subject matter of present Claim 1 lacks novelty.
4. If a claim lacks novelty, the questions of sufficiency of disclosure and inventive step are without substance.
5. For these reasons the patent must be revoked.

Order

For these reasons it is decided that:

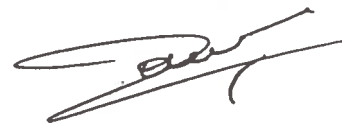
1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:



P. Martorana

The Chairman:



P. A. M. Lançon