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**Datasheet for the decision  
of 12 March 2009**

**Case Number:** T 1431/05 - 3.3.07

**Application Number:** 97937229.9

**Publication Number:** 0946268

**IPC:** B01D 61/00

**Language of the proceedings:** EN

**Title of invention:**

Method and apparatus for high efficiency reverse osmosis operation

**Patent Proprietor:**

Mukhopadhyay, Debasish

**Opponents:**

Hager + Elsässer GmbH  
Christ Pharma & Life Science AG

**Headword:**

-

**Relevant legal provisions:**

EPC Art. 123(2)  
EPC R. 80

**Relevant legal provisions (EPC 1973):**

EPC Art. 84

**Keyword:**

"Amendments - allowable (no) - Main and Auxiliary Requests"

**Decisions cited:**

-

**Catchword:**

-



Case Number: T 1431/05 - 3.3.07

**D E C I S I O N**  
of the Technical Board of Appeal 3.3.07  
of 12 March 2009

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**Decision under appeal:** Decision of the Opposition Division of the  
European Patent Office posted 10 October 2005  
revoking European patent No. 0946268 pursuant  
to Article 102(1) EPC.

**Composition of the Board:**

**Chairman:** S. Perryman  
**Members:** G. Santavicca  
F. Rousseau

## Summary of Facts and Submissions

- I. The appeal lies from a decision of the Opposition Division revoking European patent N° 0 946 268 (application N° 97 937 229.9).
- II. The patent originates from international application PCT/US97/14239, published as WO 98/06483, comprising 77 claims, Claims 1 and 2 reading as follows:

"1. A process for treatment of a feedwater stream, said feedwater stream characterized by the presence of (i) hardness, (ii) alkalinity, and (iii) at least one molecular species which is sparingly ionized when in neutral or near neutral pH aqueous solution, to produce a low solute containing product stream and a high solute containing reject stream, said process comprising:

(a) reducing the tendency of said feedwater to form scale when said feedwater is concentrated to desired concentration factor at a selected pH, by effecting, in any order, one or more of the following:

(i) removing hardness from said feedwater stream  
(ii) removing alkalinity from said feedwater stream;  
(iii) removing dissolved gases created during said hardness removal step;

(b) raising the pH of the product from step (a) to a selected pH of at least about 8.5, to urge said at least one molecular species which is sparingly ionized when in neutral or near neutral pH aqueous solution toward increased ionization;

(c) passing the product from step (b) above through membrane separation equipment, said membrane separation

equipment substantially resisting passage of dissolved species therethrough,

(d) thereby producing a product stream substantially free of said at least one molecular species which is sparingly ionized when in neutral or near neutral pH aqueous solution.";

"2. A process for treatment of a feedwater stream, said feedwater stream characterized by the presence of (i) hardness, (ii) alkalinity, and (iii) at least one molecular species which is sparingly ionized when in neutral or near neutral pH aqueous solution, to produce a low solute containing product stream and a high solute containing reject stream, said process comprising:

(a) effectively eliminating the tendency of said feedwater to form scale when said feedwater is concentrated to desired concentration factor at a selected pH, by effecting, in any order, one or more of the following:

(i) removing hardness from said feedwater stream  
(ii) removing alkalinity from said feedwater stream;  
(iii) removing dissolved gases created during said hardness removal step;

(b) raising the pH of the product from step (a) to a selected pH of at least about 9.0 by adding a selected base thereto, to urge said at least one molecular species which is sparingly ionized when in neutral or near neutral pH aqueous solution toward increased ionization;

(c) passing the product from step (b) above through membrane separation equipment to produce a reject stream and a product stream, said membrane separation

equipment substantially resisting passage of dissolved species therethrough,

(d) wherein said product stream is substantially free of said at least one molecular species which is sparingly ionized when in neutral or near neutral pH aqueous solution."

III. The patent as granted comprises 49 claims, Claim 1 reading as follows (Additions to Claim 1 as filed emphasized in bold, deletions in strike-through):

"1. A process for treatment of a feedwater stream (10) **with membrane separation equipment (30), said membrane separation equipment comprising at least one unit (30<sub>(1)</sub>) having a membrane separator,** said feedwater stream (10) ~~characterized by the presence of~~ **containing solutes therein, said solutes comprising**

(i) hardness,

(ii) alkalinity, and

(iii) at least one molecular species which is sparingly ionized when in neutral or near neutral pH aqueous solution; ~~to produce a low solute containing product stream and a high solute containing reject stream;~~ said process ~~comprising~~ **characterized by**

(a) ~~reducing~~ **effectively eliminating** the tendency of said feedwater (10) to form scale when said feedwater (10) is concentrated ~~to desired concentration factor~~ at a selected pH, **to a preselected concentration factor in a first membrane separator unit (30<sub>(1)</sub>) of said membrane separation equipment (30),** by effecting **before concentration,** in any order, ~~one~~ **two** or more of the following:

(i) removing hardness from said feedwater stream (10);  
(ii) removing **substantially all** alkalinity **associated with hardness** from said feedwater stream (10);  
(iii) removing dissolved gases **from said feedwater stream (10), whether initially present or** created during said hardness **or said alkalinity** removal step;

(b) raising the pH of the product from step (a) to a selected pH of at least about 8.5, to urge said at least one molecular species which is sparingly ionized when in neutral or near neutral pH aqueous solution toward increased ionization;

(c) passing the product from step (b) above through **said** membrane separation equipment (30), said membrane separation equipment substantially resisting passage of dissolved species therethrough, **to concentrate said feedwater (10) to said preselected concentration factor, to produce**

(i) a high solute containing reject stream (32), and  
(ii) a low solute containing product stream (34)

~~(d) thereby producing a product stream substantially free of said at least one molecular species which is sparingly ionized when in neutral or near neutral pH aqueous solution."~~

IV. The patent was opposed in its entirety on the grounds that the claimed subject-matter lacked novelty and an inventive step (Article 100(a) EPC) (opponents 01 and 02) as well as that the invention was not disclosed in a manner sufficiently clear and complete for it to be

carried out by a person skilled in the art  
(Article 100(b) EPC) (opponents 02).

- V. The decision to revoke the patent was based on the patent as granted (Main Request), on five sets of amended claims submitted with letter dated 10 May 2005 as Auxiliary Requests 1 to 5 as well as on two sets of amended claims submitted as Auxiliary Requests 6 and 7 during the oral proceedings of 10 June 2005. The Opposition Division *inter alia* found that:
- (a) The ground of opposition under Article 100(b) EPC did not prejudice maintenance of the patent.
  - (b) As regards the Main Request (claims as granted), the subject-matter of process Claim 1 was not novel over any of the cited prior art E1, D1 and D6b, and that of apparatus claim 44 was not novel over any of the cited prior art E1, E3, D1, D2 and D6b..
  - (c) Auxiliary Requests 1 and 3 still comprised Claim 44 as granted, the subject-matter of which lacked novelty, so that these requests were not allowable.
  - (d) The claims of Auxiliary Requests 2 and 5 met the requirements of Article 123(2) EPC. However, Claim 1 of each of Auxiliary Requests 2 and 5 lacked clarity (Article 84 EPC).
  - (e) Claim 1 of Auxiliary Request 4 did not comply with Article 123(2) EPC, nor was it clear (Article 84 EPC).
  - (f) Claims 1 of Auxiliary Requests 6 and 7 did not meet the requirements of Article 123(2) EPC.
  - (g) Therefore, the patent should be revoked.

VI. The patent proprietor (appellant) lodged an appeal against that decision. With the statement setting out the grounds of appeal, the appellant submitted Main and First to Fourth Auxiliary Requests. In a letter dated 16 April 2007, the appellant enclosed an amended Claim 1 for each of the Main, First, Third and Fourth Auxiliary Requests then on file. In response to a communication of the Board in preparation for the oral proceedings, the appellant submitted amended Main and First to Fourth Auxiliary Requests to replace those then on file (letter of 5 February 2009). Claim 1 of the Main Request reads as follows (additions to Claim 1 as granted emphasized in bold, deletions in strikethrough):

*Main Request*

"1. A process for treatment of a feedwater stream (10) with membrane separation equipment (30), said membrane separation equipment comprising at least one unit (30<sub>(1)</sub>) having a membrane separator, said feedwater stream (10) containing solutes therein, said solutes comprising

(i) hardness,  
(ii) alkalinity, and  
(iii) at least one molecular species which is sparingly ionised when in neutral or near neutral pH aqueous solution; said process characterised by

(a) effectively eliminating the tendency of said feedwater (10) to form scale when said feedwater (10) is concentrated at a selected pH **of at least 9.0** to a preselected concentration factor in a first **pass** membrane separator unit (30<sub>(1)</sub>) of said membrane



separation equipment (30), by effecting before concentration, ~~in any order, two or more~~ **each** of the following:

(i) removing hardness from said feedwater stream (10);

(ii) removing substantially all alkalinity associated with hardness from said feedwater stream (10); **and**

(iii) removing dissolved gas from said feedwater stream (10), whether initially present or created during said hardness or said alkalinity removal step;

(b) raising the pH of the product from step (a) to a **the** selected pH of at least ~~about 8.5~~ **9.0** to urge said at least one molecular species which is sparingly ionized when in neutral or near neutral pH aqueous solution toward increased ionization; **and**

(c) passing the product from step (b) above through said membrane separation equipment (30), said membrane separation equipment **being continuously operated at the selected pH so that it** substantially resists passage of dissolved species therethrough, to concentrate said feedwater (10) to said preselected concentration factor, to produce

(i) a high solute containing reject stream (32), and  
(ii) a low solute containing product stream (34)."

VII. Opponents 01 and 02 (respondents 01 and 02), in their respective written responses to the statement setting out the grounds of appeal, to the communication of the Board in preparation for oral proceedings as well as to

the latest requests of the appellant, have maintained their grounds of opposition and raised objections against the amended claims on file, in particular under Article 123(2) EPC.

VIII. Oral proceedings were held on 12 March 2009. After debate on the compliance with Article 123(2) EPC of the amendments contained in all of the requests then on file, the appellant submitted an Auxiliary Request made up of a fresh Claim 1 and Claims 2 to 43 that are identical to those of the Main Request, to replace the auxiliary requests then on file. Claim 1 of the Auxiliary Request reads as follows (additions to Claim 1 as granted emphasized in bold, deletions in strikethrough):

*Auxiliary Request*

"1. A process for treatment of a feedwater stream (10) with membrane separation equipment (30), said membrane separation equipment comprising at least one unit (30<sub>(1)</sub>) having a membrane separator, said feedwater stream (10) containing solutes therein, said solutes comprising  
(i) hardness,  
(ii) alkalinity, and  
(iii) at least one molecular species which is sparingly ionized when in neutral or near neutral pH aqueous solution; said process characterised by

(a) effectively eliminating the tendency of said feedwater (10) to form scale when said feedwater (10) is concentrated at a selected pH to a preselected concentration factor in a first membrane separator unit (30<sub>(1)</sub>) of said membrane separation equipment (30), by

effecting before concentration, ~~in any order, two or more~~ **each** of the following:

(i) removing hardness from said feedwater stream (10);

(ii) removing substantially all alkalinity associated with hardness from said feedwater stream (10); **and**

(iii) removing dissolved gas from said feedwater stream (10), whether initially present or created during said hardness or said alkalinity removal step;

(b) raising the pH of the product from step (a) to a selected pH of at least ~~about 8.5~~ **11** to urge said at least one molecular species which is sparingly ionized when in neutral or near neutral pH aqueous solution toward increased ionization; **and**

(c) passing the product from step (b) above through said membrane separation equipment (30), **the membrane separator of the first membrane separator unit (30<sub>(1)</sub>) of said membrane separation equipment (30) being the first membrane separator encountered by the feedwater stream during the treatment process**, said membrane separation equipment substantially resisting passage of dissolved species therethrough, to concentrate said feedwater (10) to said preselected concentration factor, to produce

(i) a high solute containing reject stream (32), and

(ii) a low solute containing product stream (34)."

IX. The appellant, in support of the amendments made to the claims as granted, has essentially argued as follows:

*Main Request*

- The apparatus claims had been deleted.
- In Claim 1, the amendment "each" instead of "two or more" was implicit in the initial definition and aimed at distinguishing over the prior art methods of e.g. E4 and D6 (JP-A-59 112 890), in which gas was not removed.
- Since step (iii) had to follow steps (i) and (ii), the as filed expression "in any order" was superfluous and could be cancelled.
- The insertion of the value for the pH in step (a) of Claim 1 was an error, and this insertion would be removed if the Board considered that this were the only obstacle to acceptability of the claim.
- The amendment "first **pass** membrane separator unit" in step (a) of Claim 1 reflected what the invention was about, i.e. that the treatment at as high as possible a pH was carried out in the first membrane hit by the feed stream.

The term "pass" was clear in context, as shown in e.g. Figures 2 and 9, and common in the field of membrane separation. In particular, reference was made to the sentence bridging pages 11 and 12 of the application as filed, to show that "pass" aimed at distinguishing over E1 (US-A-4 574 049), acknowledged in the application as filed as an unsatisfactory double pass reverse osmosis system.

- Hence, the insertion of "pass", which was the crux of the invention, was admissible.
  
- The amendment concerning the rise of the pH to at least 9.0, in step (b) of Claim 1, was based on the application as filed as follows:
  - Claim 1.
  - Page 11, lines 11 to 15. Although this passage came before the summary of the invention it said what the patent as a whole said.
  - Page 14, line 14, disclosing the expression "or up to 9", which should be construed as a minimum in context, because it was stated that an alkaline feed stream was needed.
  - Page 21, lines 6 to 8, disclosing operation at the highest feasible pH.
  - Page 29, line 13, disclosing a pH of at least about 9.0 independently from any weak ionic exchangers.
  
- Hence, operation at as high as possible a pH and a pH of 9.0 as a minimum were consistently disclosed in the application as filed.
  
- The amendment to the pH aimed at distinguishing over E2 (FILMTECH FT30 MEMBRANE ELEMENTS, Technical Manual, The Dow Chemical Company, December 1991), which (page 3, Point 4.34) disclosed a pH of up to 8.2 for the softened water fed to the membrane, as well as over D1(b) (Verified Translation of JP-A-6 63549), which

(page 8, Paragraph [0015]) disclosed a pH of 8 to 9 for the influent to the first reverse osmosis membrane separator.

- During the oral proceedings, in response to a question by the Board, as to whether or not Claim 2 as filed (Point II., *supra*), which mentions "a selected pH of at least about 9.0" in its step (b), in connection with the further feature "by adding a selected base thereto", could constitute a fair basis for the rise of the pH to at least 9.0, the appellant stated that Claim 2 was not regarded as the relevant basis for the objected-to amendment, so that the mentioned feature would not be proposed for inclusion in present Claim 1, in particular it was not desirable to include the further feature "adding a selected base thereto".
  
- As to the amendment "continuously operated at the selected pH", it had a basis in the application as filed as follows:
  - Page 11, line 14 ("continuous, sustainable, long term operations").
  - Page 15, lines 20 to 25 ("continuously produce").
  - Page 38, line 18 ("operated continuously").
  - Page 70, lines 11 to 13 ("continuous high pH operation").
  
- That amendment aimed at distinguishing over E3 (Preprint of the Aachener Membrankolloquium, held from 19 to 21 March 1991 in Aachen by the Gesellschaft Verfahrenstechnik und

Chemieingenieurwesen), which disclosed (pages 31, 32 and 41) discontinuous pH operation to destroy the biofilm on the membrane, thus filtration and declogging cyclic operations.

- Hence, "continuous" was a further distinction over E3, which disclosed step (b) but not step (c).
- Since those amendments reflected the core of the invention, i.e. a continuous operation at as high as possible a pH on the first membrane encountered by the water, to prevent scaling and biofouling, they were not arbitrary but serious attempts to deal with the grounds and the objections raised.
- Therefore, the claims of the Main Request were formally allowable.

#### *Auxiliary Request*

- The objected to amendments in step (a) ("of at least 9.0" and "pass") and in step (c) ("being continuously operated at the selected pH") had been cancelled, so that the objections thereto no longer applied.
- The amendment "a selected pH of at least 11", in step (b), was based on the application as filed, *inter alia* Claim 11 as filed.
- As to the amendment "... the first membrane separator encountered by the feedwater ..." in step (c), it was a feature shared by all of the

embodiments disclosed and shown in the application as filed.

- Even if the figures of the application as filed showed reverse osmosis systems, what mattered was the term "first membrane separator", not reverse osmosis, nor weak anion exchangers.
- In fact, the embodiments shown in Figures 3 and 4 did not contain any ionic exchangers.
- Anyhow the appellant was prepared, if necessary, to insert the expression "reverse osmosis" before the expression "separation equipment" in Claim 1.
- Finally, since removal steps (i) to (iii) of step (a) could not be carried out by membranes, the meaning of first membrane separator was clear.
- Therefore, the Auxiliary Request was admissible.

X. The respondents, as far as the amendments contained in the claims are concerned, have essentially argued that:

- In general, the need to cite so many passages of the application as filed to show the alleged core of the invention was evidence that no proper basis for the amendments existed in the application as originally filed.
- Specifically the amendment "each" instead of "two or more, in any order", and the implied specific sequence thereof in Claim 1, had no basis in the application as filed.



- A further problem arose from the inclusion of the value 9.0 for the pH also in step (a) of Claim 1.
  - No reason for the amendment was apparent so that Rule 80 EPC was not complied with.
  - It was not clear whether the increase of the pH took place before or after step (b), so the amendment introduced lack of clarity (Article 84 EPC).
  - This feature by itself had no basis in the application as filed.
  - Further there was no basis for this feature in combination with the pH mentioned in step (b) of Claim 1 (Article 123(2) EPC).
  
- As regards the separation membrane being a "first pass separation membrane", in step (a) of Claim 1:
  - There was no basis in the application as originally filed for this as a generalized feature.
  - The only reference to this appeared in certain specific embodiments in connection with other features, from which it could not be isolated.
  - On page 4 of the application as filed, the mention of a "double pass reverse osmosis design" was only in the context of the prior art acknowledged in the application as filed.
  - On page 12, "first pass" was only mentioned in connection with a generic maximum feasible pH in order to eliminate possible occurrence of scaling phenomenon.
  - As claim 1 was not limited to these specific situations, the introduction of this feature

appeared to be arbitrary, or as unallowable attempt to disclaim the prior art acknowledged, and was thus in contravention of Article 123(2) EPC.

- The introduction of the wording "first pass" also introduced lack of clarity contrary to Article 84 EPC, in so far it was not clear what was meant thereby:
  - whether the very first membrane of the system or the first membrane of a first pass membrane unit in the system; also, no "second pass" was defined in Claim 1. Finally, since "first" was different from "first pass", it was not clear what was protected, i.e. whether the amendment created an "*aliud*" directing the claim to something not originally contemplated, and thus contravening the requirements of Article 123(3) EPC.
  
- As to the amendment concerning the rise of the pH to at least 9.0, in step (b) of Claim 1, it was not disclosed as such in the application as filed, in particular: on page 11, that feature was merely presented as a negative feature of the state of the art, not as a disclosure of the alleged invention; also, on page 14, a pH value of 9.0, not of "at least 9.0", was disclosed in connection with higher pHs, which situation did not justify the selection of an arbitrary lower limit (EPO case law); further, the disclosure on page 21 did not mention a pH of at least 9.0 but higher pHs applicable to a particular reverse osmosis system (HERO<sup>(TM)</sup>), which had not been defined in Claim 1;

finally, on page 29, the disclosure concerned a specific reverse osmosis module using specific membranes, inserted in a system comprising weak anionic exchangers, that system being not the subject of Claim 1. Hence, the amendment "at least 9.0", not generally disclosed as such, had been isolated from specific contexts, either for the purpose of an arbitrary definition, or of a disclaimer over the prior art acknowledged in the application as filed, clearly not allowable.

- In response to a question by the Board, during the oral proceedings, as to whether or not Claim 2 as filed (Point II., *supra*), mentioning "a selected pH of at least about 9.0" in its step (b), in connection with the further feature "by adding a selected base thereto", could constitute a fair basis for the rise of the pH to at least 9.0, the respondents objected to that Claim 2 did not represent a fair basis for the amendment, in so far the deletion of the feature of the addition of a selected base, in the present case, was an extension of the initial subject-matter. In summary, the amendment was not based on the application as filed (Article 123(2) EPC).
  
- As regards the amendment "being continuously operated at the selected pH", the invoked instances in the application as filed did not disclose what the appellant meant: page 11 concerned a prior art reverse osmosis water treatment; page 15 mentioned "continuously produce ... a ... stream", which was different from the amendment to Claim 1 "operated

continuously at the selected pH"; page 38 concerned a specific pilot water treatment system comprising reverse osmosis membranes, not defined in Claim 1, and "operated continuously" had to do with the stream of water flow; finally, page 70 mentioned "continuous high pH operation" but in the context of the process of a HERO<sup>(TM)</sup> reverse osmosis system, that did not make the subject of Claim 1. Hence, "continuous operation" was different from a "continuous operation at a selected pH of ...". Since it was not clear what duration was meant by "continuous" (how much time?), it was not apparent that any distinction might be imparted over the method disclosed by E3 (*supra*) (Rule 80 EPC), in which continuous operation at the given pH was carried out during part of the operating cycle.

- Therefore, the amended claims of the Main Request had no basis in the application as filed (Article 123(2) EPC) and were neither clear (Article 84 EPC), nor appropriate (Rule 80 EPC), so that the Main Request was not allowable.

#### *Auxiliary Request*

- The Auxiliary Request had been filed late and was not clearly admissible.
- The amendment concerning the rise of the pH to at least 11 was not contested.
- However, it was not clear whether the terms "unit" and "membrane separator" had the same meaning,

whether membrane separator and membrane separator unit meant the same apparatus, whether a unit was an apparatus and whether a membrane separator was only a membrane. Also, the first membrane separator of a unit was not necessarily the first membrane of the first separator of the system encountered by the stream.

- Also, in the application as filed, there was no general basis for the amendment in step (c) of Claim 1. If a basis was sought in the figures, they concerned specific reverse osmosis embodiments, *inter alia* containing weak anion exchangers, which were not defined in Claim 1.

XI. The appellant (patent proprietor) requested that the decision under appeal be set aside and the patent be maintained as main request on the claims submitted as Main Request with letter of 5 February 2009 or as Auxiliary Request on the basis of Claim 1 submitted at oral proceedings on 12 March 2009 and dependent claims 2 to 43 of the Main Request sent with letter of 5 February 2009.

XII. The respondents (opponents) requested that the appeal be dismissed.

## **Reasons for the Decision**

1. The appeal is admissible.

*Main Request*

*Amendments*

2. Focussing on the amendment (Point VI., *supra*), made in step (c) of the Claim 1 according to the Main Request compared to Claim 1 as granted, namely "said membrane equipment **being continuously operated at the selected pH**", this does not meet the requirements of the EPC for the following reasons.

2.1 None of the numerous claims in the application as filed contains a feature of "said membrane equipment **being continuously operated at the selected pH**". Whether there is a basis for this feature introduced by amendment, and whether any clear meaning can be attributed to it sufficient to satisfy the requirements of Article 84 EPC thus depends on what can be derived from the description of the application as filed. How precise a meaning can be attributed to "continuously" is critical in this case, because of prior art E3 showing operation for half an hour at the pH required by the claim. The appellant chose to characterize this as "discontinuous", but in the absence of any precise definition in the claim of what is meant by "continuously" this prior art can equally be considered as showing continuous operation. This brings out the unclear nature of the amendment in this context.

2.1.1 Of the passages relied on by the appellant, those on Page 11, in particular line 14 reading:

*"in continuous, sustainable, long term operations to produce a highly purified treated water product".*

and on page 15, in particular lines 20 to 25:

*"one important and primary object of the present invention resides in the provision of a novel method for treatment of water to reliably and continuously produce over long operational cycles a water product stream of a preselected extremely high purity quality standard".*

refer to the *desideratum* of continuous production over long operational cycles of a highly pure product stream of water. The continuity is disclosed in connection with the length of the operational cycle, which length is not defined in present Claim 1, and there is no disclosure of any continuity at any preselected pH, let alone at a pH of at least 9.0 as now required by the amended claim.

2.1.2 The passage on Page 38, in particular line 18 reading:

*"The pilot plant system was operated continuously until.."*

refers to a particular pilot test, also including other specific conditions not reflected in Claim 1. From Table 1, page 40, the raw feed pH was 8.0 and the reject pH was 10.8. This cannot be taken as general disclosure to justify a feature of continuous operation at a preselected pH of at least 9.0.

2.1.3 The passage on Page 70, lines 11 to 13, in particular line 13 reading:

*"I'm not aware of any such formulation which would efficiently and cost effectively allow continuous high pH operation of RO".*

is made within the context of scale-free reverse osmosis operation at 90 percent recovery (page 70, lines 6-7), to which recovery rate Claim 1 is not limited, and specifies no pH value. It provides no basis for the amended feature in Claim 1, and does not serve to clarify the meaning of "continuously".

2.1.4 Nor has the Board found any other passages in the application as filed which could justify that amendment in step (c) of claim 1 ("being continuously operated at the preselected pH", whereby the preselected pH is, according to Claim 1, "of at least 9"). The Board concludes that the amended claim 1 does not meet the requirements of Article 84 or 123(2) EPC, and the Main Request must be refused. It is thus unnecessary to give reasons why other amendments made to claim 1 also fail to meet the requirements of the EPC.

#### *Auxiliary Request*

#### *Amendments*

3. Compared to Claim 1 as granted (Point VIII, *supra*), Claim 1 of the Auxiliary Request contains inter alia the amendment "the membrane separator of the first membrane separator unit (30<sub>(1)</sub>) of said membrane separation equipment (30) being the first membrane



separator encountered by the feedwater stream during the treatment process".

- 3.1 As explained by the appellant, the purpose of the amendment is to clarify that the feedstream is concentrated at the selected high pH of at least 11 in the membrane first hit or encountered by the stream.
- 3.2 According to the appellant, this was supposedly a common feature shared by all of the embodiments described and shown in the application as filed, so that its insertion in the generic definition of Claim 1 was formally allowable.
- 3.3 However, an explicit verbal basis for the amendment does not exist in the application as filed. In fact the description mentions at page 23, lines 20-26 that:

*"In a fourth step, the acidified effluent, containing virtually zero hardness and alkalinity, is then treated for carbon dioxide removal. This removal could be accomplished in a forced/induced draft decarbonator or in an existing vacuum degasifier of either packed bed or gas permeable **membrane** barrier design"*

- 3.3.1 Hence, in the application as filed there is direct and unambiguous disclosure that the membrane operating at high pH need not be the very first membrane encountered by the feedstream. The amendment made thus has no clear and unambiguous basis in the application as filed and already for this reason the auxiliary request is not allowable, as it does not comply with Article 123(2)EPC.

4. The appellant, without making any formal request to this effect, indicated preparedness to amend the claim further on the lines of saying "the first **reverse osmosis** membrane separator encountered by the feedwater stream during the treatment process". The Board did not ask the appellant to pursue this suggestion, since firstly, the requests are a matter for the party concerned and secondly it would not have led to an allowable claim. Although the application as filed also contemplated several reverse osmosis units in series (e.g. Claim 42, Figure 9), there was no direct and unambiguous disclosure in the application as filed that the very first membrane encountered by the feedstream was the first reverse osmosis membrane of the first unit nor as to what pH the feedwater encountering the first reverse osmosis membrane of such a multiple arrangement would have in that case.

## **Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:

S. Fabiani

S. Perryman