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D E C I S I O N
of 9 July 2002

Case Number: T 0583/99 - 3.3.6

Application Number: 94901142.3

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IPC: D21C 9/16

Language of the proceedings: EN

Title of invention:

Process for bleaching of lignocellulose-containing pulp

Patentee:

Eka Chemicals AB

Opponents:

Kemira Chemicals OY
Solvay Interlox (Société Anonyme)

Headword:

Pulp bleaching/EKA

Relevant legal provisions:

EPC Art. 56

Keyword:

"Inventive step - yes: no incentive in the prior art for the claimed solution of the technical problem"

Decisions cited:

-

Catchword:

-



Case Number: T 0583/99 - 3.3.6

D E C I S I O N
of the Technical Board of Appeal 3.3.6
of 9 July 2002

Appellant: Eka Chemicals AB
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Representative: -

Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 18 March 1999
revoking European patent No. 0 670 929 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: P. Krasa
Members: G. Dischinger-Höppler
C. Rennie-Smith

Summary of Facts and Submissions

I. This appeal is from the decision of the Opposition Division to revoke European patent No. 0 670 929 for lack of inventive step. The decision was based on amended claims according to a main and an auxiliary request. Claim 1 of the main request reads:

"1. A process for bleaching of lignocellulose-containing pulp with hydrogen peroxide, where the pulp before said bleaching is first treated with a complexing agent at a pH in the range of from 3.5 up to about 11 and at a temperature in the range of from 26°C up to about 100°C, characterised in that

- a washing is carried out after the treatment with a complexing agent and before the delignification with an organic peracid or salts thereof at a pH of at least about 4, and that

- the pulp after the treatment is delignified with an organic peracid or salts thereof at a temperature in the range of from 50°C up to about 140°C, and that

- the pulp after the delignification with the organic peracid or salts thereof and before said bleaching is washed at a pH of at least about 4, whereby

- the share of peracid added in the delignifying stage to the total amount of peracid and hydrogen peroxide added in the delignifying and bleaching stages, is less than about 60% on a weight-to-weight basis."

II. Two notices of opposition based on lack of novelty and inventive step (Articles 100(a), 54 and 56 EPC) cited

inter alia the following documents:

- (1) JP-57-21591 (and its English and French translations);
- (2) US-A-3 867 246 and
- (5) DE-A-4 114 135.

III. In its decision, the Opposition Division found that the claims as amended complied with the requirements of Articles 123(2) and (3), 84 and 54 EPC but not with those of Article 56 EPC in view of document (2) as the closest prior art when combined with document (1). The Opposition Division held that, in order to improve the brightness of the pulp, it was obvious to perform before the PA-stage in the PA-W-P-sequence disclosed in document (2) a Q-stage and a washing step as taught in document (1).

IV. The Appellant (Proprietor) with its statement of grounds of appeal filed experimental data in relation to the claimed process as compared to the prior art.

V. Oral proceedings before the Board of Appeal were held on 9 July 2002 in the absence of the Appellant as announced by letter of 28 May 2002 and of the Opponent II as announced by letter of 25 June 2002.

VI. The Appellant's arguments submitted in writing can be summarised as follows:

- Document (1) as the closest prior art explicitly taught not to perform a washing (W) between the peracid (PA) and peroxide (P) stages since the

idea was to use the peroxide left after the peracid stage for subsequent peroxide bleaching. A skilled person would therefore not introduce an intermediate washing step as disclosed in document (2) into the process of document (1).

- In view of document (1), the claimed process provided an improved product with higher brightness and viscosity at a reduced kappa number.
- Improvements have also been shown as against the PA-W-P bleaching sequence of document (2) with added complexing agent (Q).
- It was not obvious to carry out an initial separate Q-stage instead, since no particular effect of such a stage was hinted at in the prior art, for instance document (1), and since the simultaneous performance of a Q and PA stage (Q/PA) was still common practise in the early 90's, as was shown in document (5).

VII. The Respondent (Opponent I) at the oral proceedings and in writing submitted that the claimed subject-matter was not inventive for the following reasons:

- Document (2) represented the closest prior art since it disclosed bleaching in separate PA and P stages and the claimed "share of peracid". The process disclosed therein differed from the claimed one only in that a separate Q stage was initially performed.
- It was evident from the examples of document (1)

which were carried out at essentially less than about 60%, that a separate Q stage provided higher brightness in comparison with a mere addition of chelating agent to a bleaching stage.

- Moreover, the claimed subject-matter was not limited to the basic sequence Q-W-PA-W-P recited in Claim 1 but covered embodiments with additional use of complexing agents in the bleaching stages.

VIII. The Appellant requested in writing that the decision under appeal be set aside and that the patent be maintained according to its main request filed on 9 March 1999.

The Respondent requested that the appeal be dismissed.

The other party (Opponent II) made no request.

Reasons for the Decision

1. The Board confirms the findings of the Opposition Division that the amendments made to the claims during the opposition proceedings comply with the requirements of Articles 84, 123(2) and (3) EPC, and that the subject-matter of these claims is novel over the cited prior art (Article 54 EPC). This not having been contested by any party during the appeal proceedings, no further comment on this matter is necessary.
2. The only issue to be decided is, therefore, whether or not the claimed subject-matter is based on an inventive step.

2.1 Technical background

The patent in suit is concerned with chlorine-free processes for delignifying and bleaching lignocellulose-containing pulp to produce fully bleached pulp with unaltered strength properties in a reasonable number of stages and with a reasonable consumption of bleaching agent (page 2, lines 37 to 41) and suggests a Q-W-PA-W-P sequence under particular pH and temperature conditions and with a "share of peracid" of less than about 60% as defined in Claim 1 in combination with the description (page 5, lines 31 to 35) at an optional point within a bleaching process, preferably immediately after preceding oxygen delignification (page 4, lines 56 to 58 and Examples).

2.2 Closest prior art

During the oral proceedings and in writing, the Appellant based its arguments on document (2) as the closest prior art. Like the patent in suit it is concerned with a chlorine-free, plural step process for completely bleaching pulp by using in separate stages peroxide and peracetic acid as bleaching agents (column 2, lines 15 to 28 and Example 1). The Board, therefore, agrees that document (2) is a suitable starting point for assessing inventive step.

2.3 Technical problem and its solution

Document (2) discloses a preferred process starting with an initial P stage, followed by a PA stage and with washing between these stages. However, it is explicitly stated that the bleaching sequence can begin with a PA stage (column 2, lines 34 to 38, column 3,

lines 29 to 31 and column 4, lines 56 to 62). The "share of peracid" in a sequence starting with PA can be derived from steps 2 and 3 in Example 1 and amounts to 26% when calculated according to the definition in the patent in suit (page 5, lines 31 to 35). Further it is suggested to **add complex builders** (Q) in order to prevent decomposition of the per compounds in the presence of heavy metals (column 6, lines 37 to 43). Since no conditions for carrying out the treatment with a complexing agent are indicated, the Board concludes from the term "**add**" that it is carried out during the PA and/or P stage in combined Q/PA or Q/P stages. This was not contested by the Respondent.

Concerning the other process conditions given in Claim 1 (pH and temperatures), the parties agreed that they were usual in the art and the same in document (2). Considering the respective values given in document (2) (column 3, lines 22 to 25, column 4, lines 10 to 13 and Example 1), the Board has no reason to disagree.

It follows that document (2) covers processes for bleaching pulp with peracetic acid and peroxide and a "share of peracid" of less than 60% under conditions as set out in the contested claims in the sequences Q/PA-W-P and PA-W-Q/P.

With respect to this state of the art, the technical problem can be seen from Experiment 1 of the Experimental Data submitted by the Appellant with its statement of grounds of appeal, as providing a process resulting in a pulp of considerably improved brightness and strength (in terms of viscosity) at lower peroxide consumption (more residual peroxide). The Board is

satisfied that this problem was credibly solved by the claimed subject-matter in view of the said Experiment 1 where it is shown that in comparison with such possible addition of complexing agent during the bleaching stages, the claimed Q-W-PA-W-P sequence provides the beneficial results aimed at.

2.4 Inventive step

It remains to be decided whether, in view of the available prior art documents, it would have been obvious to someone skilled in the art to solve that problem by the means claimed.

- 2.4.1 In the Respondent's view, it was essential for the assessment of inventive step to consider that the claimed process was not limited to a particular bleaching sequence or chemicals to be used, but included further treatment stages, such as additional treatment with a complexing agent during the bleaching stages in the Q-W-PA-W-P sequence of Claim 1, i.e. during the PA and/or P stage.

The Board does not accept this interpretation of the claimed subject-matter since the patent as a whole makes no mention of this kind of treatment with the exception of Example 3 and the description of the background art where it is stated that treatment with a complexing agent during a peracid bleaching stage has disadvantages which can be overcome by the claimed invention (page 2, lines 32 to 41). From Example 3, showing the effect of bleaching and treatment with a complexing agent in separate stages (test 1) **instead of** carrying out a PA stage in the presence of EDTA (test 2), it becomes still more evident that the

claimed subject-matter is not intended to cover the addition of complexing agents during bleaching stages.

2.4.2 The Respondent further argued that treatment with a complexing agent in a separate stage before pulp bleaching was known to be more effective as compared to such a treatment simultaneously with or during a bleaching stage. Reference in this respect was made to document (1), which according to the Respondent showed in Example 2 that if the pulp, before bleaching, is pretreated by a separate Q stage, improved pulp brightness is obtained over a process with no such pretreatment as in Example 1. Therefore, it was obvious in the document (2) process to perform the treatment with a complexing agent in a separate stage before the PA-W-P sequence disclosed therein and not during it.

2.4.3 In fact, document (1) also relates to a process for chlorine-free bleaching of pulp using peracetic acid and hydrogen peroxide as the only bleaching agents. Acknowledging that use of peracetic acid had already been proposed in the art in O-PA-P and P-PA-P sequences, document (1) is concerned with the particular problem that peracetic acid is too expensive to be an economically viable bleaching agent (page 3, paragraphs 1, 3 and 4). In order to reduce peracetic acid costs and in the interest of economy, document (1) suggests directly using the hydrogen peroxide left after the PA stage by activation with alkali in a combined PA/P stage without intermediate washing (page 3, paragraphs 5 and 6 and page 4, first full paragraph) and to prevent or limit decomposition of the peracetic acid as well as of the hydrogen peroxide in the presence of heavy metal catalysts by treating the pulp during or before the combined PA/P stage with a

chelating agent (page 3, last paragraph to page 4, line 3, page 4, fifth full paragraph). The Board, therefore, concludes that a person skilled in the art would consider this document to belong to the relevant technical state of the art.

- 2.4.4 However, whilst the Board agrees with the Respondent that the brighter pulp is obtained in Example 2 of document (1), it does not accept that this was necessarily due to a greater effectiveness of the separate Q stage.

According to Example 1 of document (1), peracid bleaching was carried out in the presence of a complexing agent after an initial oxygen stage (page 5, Table 1). The same peracid bleaching is carried out in Example 2 which begins with the statement "Pretreatment was carried out before carrying out the peracetic acid bleaching of Example 1" and goes on to say that the pretreatment was done after the oxygen stage and was followed by a washing step (as defined by dewatering the pulp from a concentration of 8% to 25% and a then necessary dilution to 15% pulp concentration; see also Table 3). The Respondent explicitly agreed with this understanding of Example 2 of document (1).

Examples 1 and 2 of document (1) differ, therefore only in the additional pretreatment carried out in Example 2 between the oxygen stage and the bleaching stage, namely a Q stage separated from the bleaching stage by intermediate washing. It is accordingly that the effect, in terms of final brightness of the pulp and reagent consumption in the process, of a combined Q/PA/P treatment where the chelating agent is added during the PA/P stage (Example 1) can be improved by a

preceding separate Q stage (Example 2) in a Q-W-Q/PA/P sequence and the better brightness observed in Example 2 of document (1) must be attributed to this additional step.

In the Board's opinion therefore, any combination of documents (1) and (2), as regards the optimal treatment with a complexing agent within the bleaching sequence, would lead to the addition of an initial Q stage separated by intermediate washing as taught in document (1) to the bleaching sequences Q/PA-W-P and PA-W-Q/P of document (2), thus resulting in Q-W-Q/PA-W-P and Q-W-PA-W-Q/P sequences.

- 2.4.5 The Respondent did not provide any evidence supporting its allegation that an initial separate Q stage was more effective than a simultaneous treatment during the bleaching stage. Nor does the Board find any hint in the cited prior art to replace a simultaneous PA/Q treatment by a separate initial Q-W-stage, let alone any advantage in doing so.

On the contrary, as is apparent from document (5) which was published about 10 years after document (1) and about 17 years after document (2), it was still common practise in the early 90's (1992) to perform chlorine-free bleaching of pulp with peracid in the presence of a complexing agent (column 2, lines 32 to 35 and Claim 1).

3. The Board therefore concludes that, whilst the various stages in the claimed bleaching process were in principle known from the prior art, for the same purpose of effective chlorine-free bleaching and delignification but in different sequences, their

particular combination in a Q-W-PA-W-P sequence according to the process of Claim 1 of the patent in suit, in order to improve further the quality of the product obtained by the process of document (2), was not obvious in view of document (1) whether considered individually or in combination.

4. The Board, therefore, holds that the process of Claim 1 is based on an inventive step as required by Article 56 EPC.

Dependent Claims 2 to 9, which refer to preferred embodiments of Claim 1, are based on the same inventive concept and derive their patentability from that of Claim 1.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the first instance with the order to maintain the patent on the basis of Claims 1 to 9 of the main request filed on 9 March 1999 and a description to be adapted thereto.

The Registrar:

The Chairman:

G. Rauh

P. Krasa