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D E C I S I O N
of 20 September 2001

Case Number: T 0935/98 - 3.3.1

Application Number: 91121737.0

Publication Number: 0491391

IPC: C07F 9/38

Language of the proceedings: EN

Title of invention:
Water treatment agent

Patentee:
Rhodia Consumer Specialties Limited

Opponent:
Bayer AG Konzernbereich RP Patente und Lizenzen
FMC Corporation (UK) Limited

Headword:
Phosphonation/RHODIA

Relevant legal provisions:
EPC Art. 54(1)(2), 56, 104(1)

Keyword:
"Novelty (yes) - combination of method features not anticipated"
"Inventive step (yes) - unobvious method parameters"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0935/98 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 20 September 2001

Appellant: (Opponent 02)
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Decision under appeal: **Interlocutory decision of the Opposition Division of the European Patent Office posted 21 July 1998 concerning maintenance of European patent No. 0 491 391 in amended form.**

Composition of the Board:

Chairman: A. J. Nuss
Members: P. P. Bracke
H. Preglau

Summary of Facts and Submissions

I. The appeal lies from the Opposition Division's decision, dispatched on 21 July 1998, that granted Claims 1 to 26 of European patent No. 0 491 391 were found to meet the requirements of novelty and inventive step over the cited prior art.

Claim 1 as granted read:

"A method of phosphonating a compound having a carbon-carbon double or triple bond adjacent to at least one hydroxyl, carbonyl, carboxylate, sulphonate and/or phosphonate group by reacting it with a water soluble phosphite salt at a pH of at least 5 and in the presence of free radical said pH and said free radical being sufficient to convert a substantial proportion of said compound to a phosphonated derivative, and a solvent, capable of dissolving the reagents, in an amount sufficient to dissolve at least part of the reaction mixture."

Claims 2 to 26 as granted were dependent upon Claim 1.

In particular, the Opposition Division was of the opinion that the claimed process was neither known from Examples H and I of document

(7) GB-A-1 458 235

nor obviously derivable therefrom.

II. At the oral proceedings before the Board of Appeal, which took place on 20 September 2001, Opponent O1 was not represented, as announced in the letter dated

23 July 2001.

III. In the written proceedings, the Appellant (Opponent O2) filed an affidavit by Dr Alastair Sholl describing three experiments. In experiment 1, which repeats the phosphonation of acrylic acid with phosphorous acid according to the method described in Example H of document (7), the yield of phosphonated compound was 3.9%. In experiment 2, still using phosphorous acid in the reaction with acrylic acid, but without repeating the method of any of the examples of document (7), no improvement of the yield of phosphonated compound in comparison with experiment 1 was achieved. In the reaction of sodium phosphite with acrylic acid, according to experiment 3, the phosphonated product was obtained in a yield of 43%.

Therefrom, the Appellant concluded that it might be deduced that the yield of phosphonated product is higher if sodium phosphite instead of phosphorous acid is used and he submitted that once a skilled person became aware of the improved yield obtained by using a phosphite salt, it would be a routine matter also to use a salt of acrylic acid and in so doing raise the pH of the phosphonation reaction even further.

At the oral proceedings, the Appellant contested the novelty of the method according to Claim 1 over the teaching of document

(2) EP-A-0 360 747

and further submitted that the claimed method was obviously derivable from the teaching of document (2) or (7) in combination with the teachings of documents

(8) US-A-4 239 648 and

(13) US-A-2 957 931.

IV. The Respondent (Proprietor of the patent) submitted that the three experiments of Dr Alastair Sholl were of no value in showing that the claimed process was obvious, because considering the ratio of phosphite salt to acrylic acid used in the telomerisation reaction even by using the most alkaline phosphite salt the pH would be less than 5.

V. The Appellant requested that the decision under appeal be set aside to the extent that the Opposition Division found that Claims 1 to 26 as granted fulfilled the requirements of Article 52 and Article 56 EPC.

The Respondent requested that the appeal be dismissed and that the patent be maintained, plus an apportionment of costs.

Opponent I requested in writing a decision based on the file.

Reasons for the Decision

1. The appeal is admissible.

2. *Novelty*

2.1 The Respondent contested that the novelty objection based on the teaching of document (2) was admissible, since it was made by the Appellant for the first time in the appeal proceedings at the oral proceedings

before the Board of Appeal.

However, as the novelty of Claim 1 as granted vis-à-vis that document was contested in the notice of opposition by Opponent O1, the Respondent and the Board were not confronted at the oral proceedings with a new ground of opposition and also not with new facts and evidence. The reason for that is that once an appeal is lodged by the Appellant-Opponent against the decision of the Opposition Division, that decision as a whole is subject to review by the Board of Appeal and is within its jurisprudence. It is the Board's power and duty pursuant to Article 111(1) and 102 EPC to decide for itself upon each matter and each issue addressed and decided in the decision under appeal, and the Board is not bound by any finding of that decision. As the EPC does not provide a legal basis for disregarding relevant facts and evidence considered during the opposition proceedings, even if only repeated in the appeal proceedings at the oral proceedings before the Board, the novelty objection based on the teaching of document (2) is admissible.

2.2 The Appellant argued that all the parameters indicated in Claim 1 were known from document (2), describing on page 2, line 62 to page 3, line 20 and in Claims 5 and 6, the reaction of an acrylate of formula $CH_2=C(R_1)-CO_2R_3$ with a phosphite of formula $HP=O(OR_4)(OR_5)$, wherein R_3, R_4 and R_5 may independently be a metal ion, in the presence of a free radical initiator. As the teaching of document (2) thus embraces the possibility of reacting a metal salt of an acrylate with a phosphite salt in the presence of a free radical initiator, the Appellant concluded that it was implicitly disclosed in document (2) that such reaction may be conducted at a pH of at least 5 and, consequently, that the teaching

of document (2) was novelty destroying for Claim 1.

Although the Appellant agreed that the only indication in document (2) how to prepare metal salts of the phosphonated products can be found on page 3, lines 24 to 26 and 51 to 58, saying that the salt forms of the phosphonated products may be produced by substitution of some or all of the acidic hydrogen atoms by cations of the salt-forming bases, he submitted that this was only one method of preparing metal salts of the end products and that the teaching of document (2) was not restricted to that one method.

In assessing novelty of a method claim, however, the relevant question is not whether the claimed method is possibly embraced within the disclosure of a document, but whether the claimed combination of all the method features was directly and unambiguously derivable therefrom.

As in document (2) the only two examples describe a method of reacting a phosphite ester with a carboxylic acid ester and nowhere in this document an indication, albeit an indirect one, is given of specifically reacting an acrylate salt with a phosphite salt, the combination of the method features according to Claim 1 under consideration only results from a non-disclosed particular construction which is not directly and unambiguously derivable from document (2).

Therefore, the Board comes to the conclusion that document (2) is not novelty-destroying for Claim 1.

3. *Inventive step*

In accordance with the "problem-solution approach" applied by the Boards of Appeal to assess inventive step on an objective basis, it is necessary to establish the closest state of the art being the starting point, to determine in the light thereof the technical problem which the invention addresses and solves, and to examine the obviousness of the claimed solution to this problem in view of the state of the art.

3.1 According to the Appellant document (7) as well as document (2) could qualify as a suitable starting point, as both documents concern a method of phosphonating acrylates.

The "closest state of the art" is normally a prior art document disclosing subject-matter aiming at the same objective as the claimed invention and having the most relevant technical features in common.

It is undisputed that document (2) and document (7) are concerned with methods of phosphonating acrylates. As Examples H and I of document (7) describe a reaction of phosphorous acid with acrylic acid, whereas a reaction of an acrylic acid or salt thereof with phosphorous acid or a salt thereof is only embraced within the disclosure of document (2) without specifically describing such reaction, the methods described in Examples H and I of document (7) have the most relevant technical features in common with the claimed method. Thus only document (7) qualifies as the most suitable starting point for assessing inventive step.

3.2 From page 2, lines 33 to 43, of the patent in suit it follows that the reaction of acrylic acid with phosphorous acid in the presence of potassium

persulphate described in Examples H and I of document (7) resulted in a low yield of phosphonated products. This was not contested by the Appellant, but rather confirmed by experiment 1 described in the affidavit of Dr Alastair Sholl mentioning a yield of only 3.9% phosphonated product. It was not contested that in Example 3 of the patent in suit 30 mol % of the phosphorous acid had been oxidised to phosphate, the remainder (ie 70 mol %) had reacted with acrylic acid to produce a phosphonate material.

In view of the teaching of document (7), the technical problem underlying the patent in suit consists in the provision of a method of phosphonating a compound having a carbon-carbon double or triple bond adjacent to at least one hydroxyl, carbonyl, carboxylate, sulphonate and/or phosphonate group in high yield, as said on page 2, lines 52 to 57, of the patent in suit.

The patent in suit claims to solve this problem with the process as defined in Claim 1 (see point I above).

3.3 The first point to be considered in assessing inventive step is then whether it has been convincingly shown that by the process according to Claim 1 the problem underlying the patent in suit has effectively been solved.

It has never been contested that by the data presented in the examples of the patent in suit a credible case has been put forward that the problem underlying the invention, as defined in point 3.2 above, is effectively solved by the claimed process. The Board has no reason to adopt a different view.

3.4 Therefore, it remains to be decided whether a skilled

person would have expected that by a process such as now claimed phosphonated compounds could be prepared in high yield.

The Appellant submitted that it was known from Example 1 of document (8) that by reacting acrylic acid with sodium hypophosphite in water and in the presence of sodium persulphate a telomer with a phosphorus content of 12.7% was obtained. The said reaction differs from the ones described in Examples H and I of document (7) only by the use of a hypophosphite instead of a phosphite and by the use of a salt instead of an acid, and it was known from column 25, lines 53 to 69, of document (13) that hypophosphites and phosphites react with organic compounds having at least one unsaturated carbon-carbon linkage per molecule according to the same mechanism and from column 26, lines 43 to 47, of document (13) that an increase in reaction rate can sometimes be attained by using alkaline conditions when polar solvents are used. Therefore, the Appellant was of the opinion that a skilled person would have found in documents (8) and (13) sufficient indication that by using hypophosphite salts instead of hypophosphorous acid, and thus by increasing the pH, the yield of phosphonated compounds could be increased in a phosphonation reaction as described in Examples H and I of document (7).

However, since document (8) does not describe a reaction of acrylic acid with hypophosphorous acid, this document does not enable to compare the yields of phosphinated products in a reaction using a hypophosphite salt and such reaction using hypophosphorous acid. A meaningful comparison between the yields obtained in the reaction according to Example H or I of document (7) and the yield in

Example 1 of document (8) is not possible, because the reactions according to examples H and I of document (7) differ from the reaction according to the examples of document (2) not only in the use of a salt instead of the corresponding acid but also in the use of a hypophosphite instead of a phosphite and in reaction conditions, such as the molar ratio of (hypo)phosphite to acrylic acid. As in order to be regarded as relevant any comparison in the present case must be such that the difference in yield is convincingly shown to have its origin only in the use of a salt instead of an acid, the comparison made by the Appellant is not valid. Whether hypophosphites and phosphites react with organic compounds having at least one unsaturated carbon-carbon linkage per molecule according to the same mechanism is not relevant.

Also the teaching in document (13) that an increase in **reaction rate** can sometimes be attained by using alkaline conditions could not have given any hint that by conducting a phosphonation reaction at a pH of at least 5 the **yield** of phosphonated compounds would be increased, since it is well known that reaction rate and yield are not directly related.

3.5 Additionally, the three experiments in the affidavit of Dr Alastair Sholl cannot be considered as supporting evidence that the claimed method was obviously derivable from the prior art, because in the assessment of inventive step it is only relevant whether the claimed method was obviously derivable from the cited prior art.

As the statement of the patent in suit, that the yields according to Examples H and I of document (7) are low,

is confirmed by experiment 1 and as experiments 2 and 3 neither concern a method according to present Claim 1 nor a method according to any of the cited prior art documents, those experiments do not provide any additional reasons why the claimed method would be obviously derivable from the cited prior art.

3.6 Since in none of the cited prior art documents the relevance of the pH was recognised, a skilled person, starting from the methods described in examples H and I of document (7) did not have any incentive to select a pH of at least 5 in order to achieve a high yield of phosphonated product.

3.7 As the Appellant was of the opinion that document (2) might even so qualify as an appropriate starting point in assessing inventive step, the Board wants to add, that the claimed method is also not obvious when starting from the teaching of document (2).

Starting from document (2), the Appellant submitted that the problem to be solved would be the avoidance of organic solvents.

However, the avoidance of an organic solvent cannot be seen as a problem underlying the present invention, since Claim 1 is not restricted to any kind of solvents, let alone, a non-organic solvent.

Moreover, since a skilled person would have realised that the phosphonation reaction of acrylic acid with phosphorous acid in aqueous medium, as described in examples H and I of document (7), provides phosphonated compounds in only low yields and since the relevance of the pH was not recognised in any of the cited prior art documents, a skilled person had no incentive to select

a pH of at least 5 in order to obtain phosphonated compounds in high yield (see point 3.6 above).

3.8 Therefore, the Board comes to the conclusion that the method according to Claim 1 is not obvious over the cited prior art.

Claims 2 to 26, which represent preferred embodiments of Claim 1, derive their patentability from the same inventive concept.

4. As the appeal was directed to Claims 1 to 26 as granted only, the Board has no competence to decide on Claims 27 to 42 underlying the decision of the Opposition Division.

5. *Apportionment of costs*

According to Article 104(1) EPC each party to the proceedings shall meet the costs he has incurred unless a decision of an Opposition Division or a Board of Appeal, for reasons of equity, orders a different apportionment of costs incurred in oral proceedings. According to the jurisprudence of the Boards of Appeal, such reasons of equity can be accepted (and thus an apportionment of costs justified) if the conduct of one party is not in keeping with the care required in the exercise of its legal rights and some criteria determining whether costs are to be apportioned have been developed by the jurisprudence (see the Case Law of the Boards of Appeal of the European Patent Office, third edition, 1998 chapter VII, paragraph C.13.3).

The filing of an appeal, as such, or the failure of a party to have an impugned decision set aside cannot be

considered as a conduct not in keeping with the care required and, consequently, cannot in the present case lead to a different apportionment of costs according to Rule 104(1) EPC.

Order

For these reasons it is decided that:

1. The appeal is dismissed.

2. The request for apportionment of costs is refused.

The Registrar: The Chairman:

N. Maslin A. Nuss