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D E C I S I O N
of 27 June 2002

Case Number: T 0140/00 - 3.3.1

Application Number: 92906260.2

Publication Number: 0646103

IPC: C07C 2/08

Language of the proceedings: EN

Title of invention:
BF3-tertiary etherate complexes for isobutylene polymerization

Patentee:
BP Corporation North America Inc.

Opponent:
BASF Aktiengesellschaft Patente, Marken und Lizenzen

Headword:
BF3-tertiary ethers/BP

Relevant legal provisions:
EPC Art. 54, 56, 114(2)

Keyword:
"Late filed evidence (not admitted) - fresh document at oral proceedings - no hard copy of document provided - fresh issues"
"Novelty (yes) - prior art silent about feature - no implicit disclosure"
"Inventive step (yes) - use of complex as catalyst not suggested in prior art"

Decisions cited:
T 0099/85, T 0198/88, T 0536/88, T 0951/91

Catchword:
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Case Number: T 0140/00 - 3.3.1

D E C I S I O N
of the Technical Board of Appeal 3.3.1
of 27 June 2002

Appellant: (Opponent)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 13 December 1999 rejecting the opposition filed against European patent No. 0 646 103 pursuant to Article 102(2) EPC.**

Composition of the Board:

Chairman: P. P. Bracke
Members: R. Freimuth
J. P. B. Seitz

Summary of Facts and Submissions

I. The Appellant (Opponent) lodged an appeal on 8 February 2000 against the decision of the Opposition Division posted on 13 December 1999 rejecting the opposition against European patent No. 646 103 which was granted on the basis of ten claims, the only independent claim 1 reading as follows:

"1. A process for producing an unsaturated polymer which consists essentially of polyisobutylene, which process comprises polymerising isobutylene or a mixed C_4 hydrocarbon feedstock containing at least 5 weight % isobutylene and up to 20 parts per million water, in the presence as catalyst of a boron trifluoride ether complex wherein the ether of said complex has at least one tertiary carbon bonded to the ether oxygen."

II. Notice of Opposition had been filed by the Appellant requesting revocation of the patent as granted in its entirety for the ground of lack of novelty and inventive step. *Inter alia* the following documents were submitted in opposition proceedings:

(1) US-A-4 605 808,

(2) DE-A-2 908 426,

(3) DE-C-1 216 865 and

(6) US-A-2 197 023.

III. The Opposition Division held that the subject-matter claimed was novel and involved an inventive step in the light of the documents cited. Document (1) disclosed a

process for polymerising isobutylene using as catalyst a preformed complex of boron trifluoride and an alcohol while the patent in suit was using a boron trifluoride tertiary ether complex. The Opposition Division was not convinced by the Opponent's allegation that the boron trifluoride present in the polymerisation medium acted as acid condensing agent to effect the reaction of isobutylene with the alcohol to produce a tertiary ether. Though the documents (2), (3) and (6) described this specific condensation reaction producing the tertiary ether, there was no evidence on file that under the particular polymerisation conditions of the process of document (1), i.e. at low temperatures and within short reaction times, the boron trifluoride tertiary ether complex was in fact formed. However, the Opponent carried the burden of proof for his allegation. For discharging that burden it would have been necessary to show that in the process of document (1) boron trifluoride ethers were produced.

In the assessment of inventive step document (1) was considered as closest prior art. Starting from this document the problem underlying the patent in suit was seen in providing an improved process wherein the resulting polymer had a higher percentage of vinylidene unsaturation. The comparative experiments "Appendix B" submitted in opposition proceedings on 29 October 1999 demonstrated the superiority of the claimed process over document (1). While documents (2), (3) and (6) described the preparation of tertiary ethers, none thereof pointed to any use of those ethers or of their complex with boron trifluoride. In fact these documents did not relate at all to the field of polymerisation and could not give any hint to the modification of the polymerisation process of document (1).

IV. The Appellant submitted that document (1) which disclosed a process for polymerising isobutylene in the presence of a boron trifluoride catalyst, anticipated the subject-matter claimed.

While he conceded that document (1) did not explicitly disclose the mandatory feature of the claimed process not to exceed a water concentration of 20 ppm in the isobutylene feed, he stated that this feature nevertheless was satisfied in the process of this document. The Appellant argued that a water concentration below the threshold of 20 ppm was conventional in the art since the isobutylene feed usually came directly from a cracking process. Furthermore he alleged that the polymerisation process according to the last example in Table 1, section (a) of document (1) using a molar ratio for BF_3:EtOH of 0.5:1 would not have worked if any water had been present in the isobutylene feed.

Though a complex of boron trifluoride and an alcohol was added according to the process of document (1), that process was in fact carried out in the presence of a boron trifluoride tertiary ether complex as catalyst since that latter complex was formed with isobutylene during the polymerisation. In support of his argument the Appellant submitted two test reports with his letters dated 13 April 2000 and 30 April 2002, the latter test report repeating exactly example 2 of document (1). Thus, document (1) disclosed all the features of the claimed process.

With respect to inventive step, the Appellant considered document (1) to represent the closest prior art since it aimed at a high vinylidene content in the

final polymer. That document taught to use a complex of boron trifluoride and an alcohol in the polymerisation process of isobutylene. In view of documents (2), (3) and (6) describing the formation of the boron trifluoride tertiary ether complex from isobutylene, an alcohol and boron trifluoride the skilled person was well aware that tertiary ethers were also formed in the polymerisation process of isobutylene. It was therefore obvious to use tertiary ethers and boron trifluoride as catalyst complex for that polymerisation process.

During the oral proceedings before the Board the Appellant addressed for the first time the fresh document

(7) US-A-2 559 062

in order to object to inventive step. He submitted that he did not provide a hard copy of document (7) to the Board and the other party since it was cited in the specification of the patent in suit on page 4, line 1. He argued that this fresh document rendered the use of a boron trifluoride tertiary ether complex as catalyst obvious.

V. The Respondent (Proprietor of the patent) submitted that document (1) was not novelty destroying since neither the mandatory feature of the claimed process not to exceed a water concentration of 20 ppm in the isobutylene feed was disclosed therein nor was a boron trifluoride tertiary ether complex present during the polymerisation of isobutylene.

Document (1) did not disclose the water concentration in the isobutylene feed since it was completely silent

about that feature. Though the Respondent conceded that a low water concentration was conventionally aimed at in the art, he disputed that the threshold of 20 ppm water was necessarily satisfied in the process of that document as the polymerisation process would operate below and above that limit. Thus, that feature was disclosed neither explicitly nor implicitly in document (1).

Document (1) disclosed the addition of a complex of boron trifluoride and an alcohol acting as catalyst in that polymerisation process. A boron trifluoride tertiary ether complex was not formed during the polymerisation step. The tertiary ether detected in the test reports of the Appellant was formed only in the subsequent quenching step and its formation or not in that step depended on the nature of the quenching agent. To support his submission he filed two test reports with his letters dated 17 October 2000 and 24 May 2002 and raised objections against the Appellant's test report dated 13 April 2002.

Having regard to inventive step, the problem in view of the closest prior art document (1) was the provision of an alternative process for polymerising isobutylene. That document contained no suggestion of using a boron trifluoride tertiary ether catalyst. Nor disclosed or suggested the documents (2), (3) and (6) to use that complex as a catalyst in the polymerisation of isobutylene. Those documents could not give any hint since they did not relate to the polymerisation of isobutylene, but to an entirely different process, i.e. the preparation of tertiary ethers by reaction of an alcohol and an olefin in the presence of an acid catalyst. Therefore the claimed invention was not

obvious.

The Respondent objected to the fresh document (7). That document should not be admitted into the proceedings as the Appellant addressed it not until the very last moment of the appeal proceedings, namely the oral proceedings before the Board. Since a hard copy of document (7) was not provided by the Appellant at the oral proceedings the Respondent was not in a position to examine the content of that document and to discuss it on the spot.

VI. The Appellant requested that the decision under appeal be set aside and the patent be revoked.

The Respondent requested that the appeal be dismissed.

VII. Oral proceedings were held on 27 June 2002. At the end of the oral proceedings the decision of the Board was given orally.

Reasons for the Decision

1. The appeal is admissible.

2. *Late filed evidence (Article 114(2) EPC)*

2.1 Document (7) is new evidence cited for the first time by the Appellant at the oral proceedings before the Board and has so far been relied upon in neither the opposition nor the appeal proceedings. No reasons have been given for this filing at the very last moment. The Respondent objected to its introduction into the appeal proceedings for this very reason. Due to the

Appellant's failure to provide a hard copy of document (7) at the oral proceedings before the Board, the Respondent refused to comment on that document since he was not aware of its particular content.

2.2 The Appellant relies on fresh facts alleged to be disclosed in document (7). He bases a fresh line of arguments in respect of obviousness of the claimed invention on that document. Hence, the disclosure of document (7) goes beyond the factual framework of the proceedings thus far. The Appellant has even failed to provide a hard copy of that document at the oral proceedings before the Board thereby preventing the Respondent and the Board to examine the content of document (7) on their own. The Appellant has given no reason for addressing that document so late and for not providing a copy thereof at the oral proceedings.

The discretionary power given to the Board pursuant Article 114(2) EPC serves to ensure that proceedings can be concluded swiftly in the interests of the parties and the general public, and to forestall tactical abuse (see decision T 951/91, OJ EPO 1995, 202, point 5.15 of the reasons). In the present case the behaviour of the Appellant comes close to an abuse of procedure and admitting document (7) would lead to an excessive delay in the proceedings. Therefore it is fully justified not to admit that document into the proceedings.

2.3 Though document (7) has been cited in the specification of the patent in suit on page 4, line 1, it has merely been acknowledged as conventional background art; it is not considered therein as essential or as the closest prior art and starting point of the claimed invention.

Therefore, that document does not automatically form part of the appeal proceedings and, thus, is late-filed evidence subject to a discretionary decision of the Board (see decisions T 198/88, OJ EPO 1991, 254; T 536/88, OJ EPO 1992, 638).

2.4 Consequently, the Board, exercising its discretion under Article 114(2) EPC, decides to disregard document (7) in the proceedings.

3. *Novelty*

The Appellant challenged the novelty of the claimed invention exclusively with regard to document (1), not relying on any further document cited so far in the proceedings. Therefore, the Board limits its detailed considerations with respect to novelty to that document.

3.1 Document (1) is directed to a process for polymerising isobutylene which uses as catalyst a preformed complex of boron trifluoride and an alcohol (claims 1 and 4). That process is exemplified in particular in example 2, Table 1. The claimed process, however, is operated in the presence of a boron trifluoride tertiary ether complex as catalyst and the water content in the isobutylene feed does not exceed 20 parts per million (claim 1, page 5, lines 39 to 49).

3.2 Document (1) is silent about the water content in the isobutylene feed of the polymerisation process and does not give any information or indication to operate the process at a particular water content in the feed. Thus, there is no dispute between the parties that the claimed threshold of 20 ppm for the water content is

not explicitly disclosed in that document.

Nor is this threshold implicitly disclosed in document (1). From a technical point of view the polymerisation process of that document may be operated at a water content below as well as above the threshold of 20 ppm. The specification of the patent in suit indicates on page 5, lines 47 to 49 that exceeding this threshold merely reduces the vinylidene content of the final polymer, however, without preventing the polymerisation reaction as such. Hence, the claimed threshold of 20 ppm for the water content is not necessarily and automatically satisfied in the process of document (1).

3.3 The Appellant argued that a water concentration below the threshold of 20 ppm was conventional in the art thereby conceding, however, that a water concentration above the threshold of 20 ppm is not excluded in the process of document (1). Furthermore he alleged that the polymerisation process according to the last example in Table 1, section (a) of document (1) would not work if any water had been present in the isobutylene feed concluding therefrom that the water content was below the claimed threshold. The Appellant, when reading this example of document (1), has merely speculated without providing substantiating facts or evidence in support of that allegation. The burden of proving the facts it alleges lies with the party invoking these facts. If a party, whose arguments rest on these alleged facts, is unable to discharge its onus of proof, it loses thereby. In the absence of any pertinent evidence presented by him, the Appellant has not discharged the burden of proof which is upon him, with the consequence that the Board does not accept his allegation.

3.4 According to established jurisprudence of the Boards of Appeal a prior art document does not disclose a specific technical feature if it does not, for the skilled person, emerge clearly and unambiguously from that document. The indication of a specific technical feature in the patent in suit which is lacking in that document amounts to the addition of fresh information not provided for the skilled person by that document (see e.g. decison T 99/85, OJ EPO 1987, page 413, point 2.2 of the reasons). Applying this principle in the present case results in the conclusion that document (1) does not disclose clearly and unambiguously an isobutylene feed in the polymerisation process having a water content up to the threshold of 20 ppm with the consequence that this document is not detrimental to the novelty of the process claimed.

3.5 Since one technical feature already distinguishes the subject-matter claimed from document (1), namely the water content not exceeding the threshold of 20 ppm as set out above, there is no need for the Board to decide on the existence or non-existence of a further distinguishing feature, i.e. the presence or absence of a boron trifluoride tertiary ether complex in the process of that document.

3.6 To summarize, in the Board's judgement, document (1) does not anticipate the claimed invention. Therefore the Board concludes that the subject-matter of the claims is novel within the meaning of Articles 52(1) and 54 EPC.

4. *Inventive step*

4.1 The patent in suit is directed to a process for

preparing an unsaturated polymer which process comprises polymerising isobutylene in the presence of a boron trifluoride catalyst. The patent in suit aims at a high percentage of vinylidene double bonds in the unsaturated polymer.

A similar process already belongs to the state of the art in that document (1) discloses in claims 1 and 4 a process for preparing an unsaturated polymer which process comprises polymerising isobutylene in the presence of a catalyst which is a preformed complex of boron trifluoride and an alcohol. The unsaturated polymer has a high degree of vinylidene double bonds.

For these reasons, the Board considers, in agreement with the Appellant, the Respondent and the Opposition Division, that the disclosure of document (1) specified above represents the closest state of the art, and, hence, the starting point in the assessment of inventive step.

4.2 In view of this state of the art the problem underlying the patent in suit as submitted by the Respondent consists in providing a further process for the polymerisation of isobutylene producing an unsaturated polymer.

4.3 As the solution to this problem the patent in suit proposes a process for polymerising isobutylene in the presence as catalyst of a boron trifluoride tertiary ether complex.

4.4 The Appellant never disputed that the claimed process successfully achieves the polymerisation of isobutylene producing an unsaturated polymer; and the Board is not

aware of any reason for challenging this finding. The specification of the patent in suit demonstrates in examples XI to XVI the polymerisation of isobutylene in the presence as catalyst of a boron trifluoride tertiary ether complex forming an unsaturated polymer. For these reasons, the Board is satisfied that the problem underlying the patent in suit has been successfully solved.

4.5 Finally, it remains to be decided whether or not the proposed solution to the problem underlying the patent in suit is obvious in view of the cited state of the art.

4.5.1 The closest prior art document (1) to start from teaches to use a preformed complex of boron trifluoride and an alcohol as catalyst in the polymerisation of isobutylene. It does not give any incentive to modify that catalyst by using a boron trifluoride tertiary ether complex. Thus, document (1), on its own, does not render obvious the solution proposed by the claimed invention.

4.5.2 Documents (2), (3) and (6) describe a process for preparing tertiary ethers by reaction of an alcohol and an olefin in the presence of an acid catalyst, boron trifluoride being mentioned *inter alia*. These documents are not directed to a process for polymerising isobutylene, but they relate to an entirely different process. They even neither point to a complex of tertiary ethers with boron trifluoride as such nor to the use of those tertiary ethers or of their complex with boron trifluoride as catalyst in a polymerisation process of isobutylene. Hence, documents (2), (3) and (6) do not address the technical problem underlying the

patent in suit of providing a further process for the polymerisation of isobutylene producing an unsaturated polymer (cf. point 4.2 above). Therefore these document cannot give any hint on how to solve that problem since the skilled person would not take their teaching into consideration at all when looking for a solution to the problem underlying the invention.

Consequently, documents (2), (3) and (6) do not render obvious the proposed solution to the technical problem underlying the patent in suit.

The Appellant alleged that in view of those documents tertiary ethers were necessarily formed also in the polymerisation process of document (1) from alcohol and isobutylene under acidic conditions. He submitted that the skilled person was aware of the formation of tertiary ethers in document (1) thereby implying that it was obvious to use tertiary ethers and boron trifluoride as catalyst complex for the polymerisation of isobutylene. Regardless of the factual formation or not of tertiary ethers in the polymerisation process of document (1), the Appellant's objection of obviousness based on documents (2), (3) and (6) leaves aside, however, the decisive fact that those documents neither address a polymerisation process for isobutylene nor point to the use of a boron trifluoride tertiary ether complex as catalyst for that polymerisation process. Hence, the skilled person would ignore documents (2), (3) and (6) when aiming at a solution to the problem underlying the patent in suit.

4.5.3 The Appellant not relying on further documents in order to object to a lack of inventive step, the Board is satisfied that none of the aforementioned documents in

the proceedings, either individually or in combination, renders the proposed solution obvious.

4.6 For these reasons, the Board concludes that the subject-matter of claim 1, and by the same token that of dependent claims 2 to 10 involves an inventive step within the meaning of Articles 52(1) and 56 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

N. Maslin P. P. Bracke