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D E C I S I O N
of 23 April 2002

Case Number: T 1114/98 - 3.3.3

Application Number: 88312226.9

Publication Number: 0322241

IPC: C08F 10/10

Language of the proceedings: EN

Title of invention:

Process for preparing polybutenes having enhanced reactivity
using boron trifluoride catalysts

Patentee:

ExxonMobil Chemical Patents Inc.

Opponent:

The Lubrizol Corporation
BASF Aktiengesellschaft, Ludwigshafen

Headword:

-

Relevant legal provisions:

EPC Art. 54, 84, 123(2), 123(3)
EPC R. 29(1)

Keyword:

"Novelty (no)"
"Late filed request"
"Clearly not allowable"

Decisions cited:

T 0153/85, T 0955/91, T 0577/97

Catchword:

-



Case Number: T 1114/98 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 23 April 2002

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Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 9 October 1998
revoking European patent No. 0 322 241 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: R. Young
Members: C. Idez
J. De Preter

Summary of Facts and Submissions

- I. The grant of European patent No 0 322 241 in respect of European patent application No. 88312226.9, filed on 22 December 1988, and claiming the priority of the earlier US patent application No. 136867 of 22 December 1987, was announced on 2 November 1994 (Bulletin 94/44) on the basis of 18 claims.

Claim 1 as granted read as follows:

"A process for the preparation of a polybutene having a number average molecular weight (M_n) of from 500 to 5,000 and a total terminal double bond content of at least 40%, based on the total theoretical unsaturation of the polybutene, said polybutene containing at least 50% by weight isobutylene units based on the polybutene M_n which comprises:

- (1) contacting a feed comprising at least 10% by weight isobutylene, based on the weight of the feed, with a BF_3 catalyst in a manner and under conditions sufficient to cationically polymerize said feed in the liquid phase to form said polybutene, said polymerization being conducted in the presence of a catalyst promoter (a) at an average polymerization time of from 12 to 40 minutes, (b) at a ratio of millimoles of BF_3 to moles of isobutylene in the feed of from 0.1:1 to 5:1, (c) at a polymerization temperature of from $-20^\circ C$ to $+25^\circ C$, and (d) to an isobutylene conversion of at least 70%; and (2) immediately quenching the polybutene product by contact with a quench medium sufficient to deactivate said BF_3 catalyst before the temperature of the product

exceeds by 5°C the highest polymerization temperature employed."

Claims 2 to 14 were dependent claims directed to elaborations of the process according to Claim 1.

Independent Claim 15 read as follows:

"A process for the preparation of polybutenyl substituted saturated intramolecular anhydride in which (A) a polybutene prepared by a process of any of claims 1 to 14 is reacted with (B) a monounsaturated intramolecular anhydride in the absence of chlorine."

Dependent Claims 16 to 18 dealt with specific embodiments of the process according to Claim 15.

II. Notices of Opposition were filed on 28 July 1995 by The Lubrizol Corp. (referred as Opponent I) and on 31 July 1995 by BASF AG (referred as Opponent II), respectively, both parties requesting the revocation of the patent in its entirety. The oppositions were based on the grounds of lack of novelty and lack of inventive step (Opponents I and II) and on the ground of insufficient disclosure (Opponent I).

The objections were supported inter alia by the following documents:

D1: US-A-4 605 808, and

D1': EP-A-0 145 235.

III. By a decision announced orally on 15 September 1998 and issued in writing on 9 October 1998, the Opposition Division revoked the patent.

The decision of the Opposition Division was based on two sets of 18 claims, both submitted at the oral proceedings of 15 September 1998, forming respectively a main request and an auxiliary request. Claim 1 of the main request differed from Claim 1 as granted by the introduction of the wording "continuous" before the word "process" in the first line of the claim. Claim 1 of the auxiliary request differed from Claim 1 of the main request only by the incorporation of the expression "whilst during the quench under pressure sufficient to avoid vaporization of the BF₃ catalyst and other compounds of the mixture". Claims 2 to 18 of both requests exactly corresponded to Claims 2 to 18 as granted.

The Opposition Division revoked the patent on the grounds that Claim 1 of the main request was not novel in view of documents D1 and D1' and that Claim 1 of the auxiliary request did not comply with the requirements of Article 84 EPC.

More precisely, the decision held that Example 1 of D1 and D1' described a continuous polymerization process inside the scope of Claim 1 of the contested patent at -5°C. According to this process, and as agreed by all parties, the polymerization mixture was collected in a product collection vessel in which the polymerization continued until the polymerization mixture was quenched. This quenching took place after a polymerization time of 16 minutes. As stated in the decision under appeal, the quenching took place at a moment when the polymerization was still going, and it thus occurred either at the highest polymerization temperature or below that temperature. As indicated in the decision, the Opposition Division did not agree

with the statement of the Patent Proprietor that the expression "the highest polymerization temperature" should be read as "the highest temperature reached during part of the polymerization which took place in the polymerization reactor".

Furthermore, the experimental evidence provided by Opponent II with its letter of 25 July 1997 and the declaration of Mr. W. M. Davis submitted by the Patent Proprietor with its letter of 23 July 1998 showed that the polymerization temperature in Example 1 of D1 and D1' was inside the range of -20°C to + 25°C. Thus, the Opposition Division came to the conclusion that Claim 1 of the main request lacked novelty.

Concerning the auxiliary request, it was held in the decision under appeal that the expression "whilst during the quench under sufficient pressure to avoid vaporization of the BF₃ catalyst and other compounds of the mixture" in Claim 1 did not comprise the conditions required to achieve "the avoidance of vaporization of BF₃ and other compounds of the mixture" and that therefore Claim 1 did not comply with Article 84 EPC.

IV. A Notice of Appeal against the above decision was lodged on 1 December 1998 by the Appellant (Patent Proprietor), the prescribed fee being paid on the same day.

With the Statement of Grounds of Appeal filed on 8 February 1999, in which its main request was the maintenance of the patent as granted, it further submitted a set of Claims 1 to 18 as a new auxiliary request (referred to as set A). Claim 1 of this auxiliary request differs from Claim 1 as granted by

the incorporation of the expression "as indicated by temperature measurement of the contents of the reactor" after "polymerization temperature employed" in the last line of the claim. Claims 2 to 18 of the auxiliary request are the same as Claims 2 to 18 as granted.

The arguments presented by the Appellant in the Statement of Grounds of Appeal may be summarized as follows:

(i) A clear support for the amendment carried out in the auxiliary request was to be found on page 13, lines 54 and 55, page 19, line 11 and in the examples of the patent in suit.

(ii) The finding of lack of novelty in the decision under appeal had been based on the interpretation by the Opposition Division of the expression "highest polymerization temperature". The Opposition Division was wrong when interpreting this expression as meaning the highest temperature reached during the whole polymerization, instead of, as submitted by the Patentee, the highest temperature reached during part of the polymerization that took place in the polymerization reactor.

(iii) Contrary to the statements of the Opposition Division that there was no support for this limitation in the original application, it was beyond reasonable doubt that the expression "highest polymerization temperature" referred to the highest temperature of the mixture in the reactor for the following reasons:

(iii.1) The passages on lines 55 to 57 on page 11 and on lines 45 to 46 on page 12 of the patent in suit

clearly established a distinction between the contents of the reactor and the product removed from the reactor.

(iii.2) The passage at page 12, lines 51 to 56 contained a clear statement that the temperature of the material was that of the material in the reactor.

(iii.3) It was clear from the drawings and their description at page 13, line 48 to page 14, line 7, and from the examples that the reaction temperature was that measured in the reactor.

(iv) The argument of the Opponents that the process of Example 1 of D1 would involve immediate quench in that it was carried out at 650 mm Hg absolute pressure and, hence a boiling system which would be cooled due to condensation, was not well founded. This example of D1, contrary to the statements of the Opponents, did not refer to the absolute pressure but to the pressure above ambient. It was evident in view of column 2, lines 33 to 40 of D1 and of the isobutene feed used in Example 1, that the system must be under pressure in order to carry out the process in the liquid phase as required by D1.

(v) Thus, the subject-matter of Claim 1 of the main and the auxiliary request were novel.

V. The arguments presented by Respondent I (Opponent I) in its letter of 23 August 1999 and by Respondent II (Opponent II) in its letter of 25 August 1999 may be summarized as follows:

(i) It was clear from the patent specification that

the polymerization time, and hence the polymerization temperature, was not restricted to the time spent in any reactor. In that respect, reference was in particular made to lines 5 to 12, 26 to 28, and 37 to 42 on page 11 of the patent in suit.

(ii) Thus, the interpretation made by the Opposition Division of expression "highest polymerization temperature" was correct.

(iii) From the actual words of Claim 1 of the main request, it could be seen that the highest final temperature was that when the mixture became quenched. In Example 1 of D1, there was no possibility of further temperature rise after quenching commenced following the contact time of 16 minutes. This was also supported by the experimental report submitted by Respondent II, presented as a repetition of Example 1 of D1, with its letter dated 25 July 1997.

(iv) Contrary to the statements of the Appellant, the reaction pressure of 650 mm Hg in Example 1 of D1 should be interpreted as the absolute pressure. This was clear from lines 24 to 25 on column 3 of D1 which referred to the process pressure in terms of absolute pressure, and confirmed by the above experimental report of Respondent II which showed that the system was in the liquid phase under an absolute pressure of 650 mm Hg.

(v) Thus, the subject-matter of the main request lacked novelty over D1.

(vi) Claim 1 of the auxiliary request was not allowable under Article 123(2) EPC, since there was no sufficient

support for the feature that the highest polymerization temperature should be "as indicated by temperature measurement of the contents of the reactor". The passages cited by the Appellant, at best, provided support only for a temperature measurement of the contents of the specific reactor disclosed in Figure 1 of the patent in suit, but they did not link this temperature measurement with the concept of immediate quenching.

(vii) Claim 1 of the auxiliary request would not meet the requirements of Article 84 since it lacked support in the description and since it also lacked clarity because there was no antecedent in this claim for the expression "the reactor".

VI. With its letter dated 25 March 2002, the Appellant filed two sets of 18 claims, referred as sets B and C, representing two further auxiliary requests.

Claim 1 of Set B reads as follows

"A continuous process for the preparation of a polybutene having a number average molecular weight (M_n) of from 500 to 5,000 and a total terminal double bond content of at least 40%, based on the total theoretical unsaturation of the polybutene, said polybutene containing at least 50% by weight isobutylene units based on the polybutene M_n which comprises:

(1) contacting a feed comprising at least 10% by weight isobutylene, based on the weight of the feed, with a BF_3 catalyst in a manner and under conditions sufficient to cationically polymerize said feed in the liquid phase to form said polybutene, said polymerization being

conducted in the presence of a catalyst promoter (a) at an average polymerization time of from 12 to 40 minutes, (b) at a ratio of millimoles of BF_3 to moles of isobutylene in the feed of from 0.1:1 to 5:1, (c) at a polymerization temperature of from -20°C to $+25^\circ\text{C}$, and (d) to an isobutylene conversion of at least 70%; and

(2) immediately quenching the polybutene product by contact with a quench medium sufficient to deactivate said BF_3 catalyst before the temperature of the product exceeds by 5°C the temperature of the product exiting the reactor."

Claims 2 to 18 of Set B correspond to Claims 2 to 18 as granted.

Set C differed from Set B only in that Claim 1 had been further amended by deleting the wording "average" before "polymerization time" in step (1) of the claimed process.

Concerning these auxiliary requests, the Appellant essentially argued that they did not involve the addition of new matter, since the reference to the temperature of the product exiting the reactor in step (2) of Claim 1 of both requests was supported by the published patent as well as the published patent application, and since, in a continuous process concerning an exothermic polymerization reaction, the temperature at the exit of the reactor would be equal to the highest polymerization temperature.

VII. At the oral proceedings held on 23 April 2002, the Appellant withdrew its auxiliary request represented by the set of claims C submitted with its letter of

25 March 2002, and replaced it by a set of 18 claims (referred to as set D) as a new auxiliary request.

Claim 1 of set D reads as follows:

"A continuous process for the preparation of a polybutene having a number average molecular weight (M_n) of from 500 to 5,000 and a total terminal double bond content of at least 40%, based on the total theoretical unsaturation of the polybutene, said polybutene containing at least 50% by weight isobutylene units based on the polybutene M_n which comprises:

(1) contacting a feed comprising at least 10% by weight isobutylene, based on the weight of the feed, with a BF_3 catalyst in a manner and under conditions sufficient to cationically polymerize said feed in the liquid phase to form said polybutene, said polymerization being conducted in the presence of a catalyst promoter (a) at an average polymerization time of from 12 to 40 minutes, (b) at a ratio of millimoles of BF_3 to moles of isobutylene in the feed of from 0.1:1 to 5:1, (c) at a polymerization temperature of from -20°C to +25°C, (d) at a polymerization pressure from 100 to 500 kPa, and (e) to an isobutylene conversion of at least 70%; and

(2) immediately quenching the polybutene product by contact with a quench medium sufficient to deactivate said BF_3 catalyst before the temperature of the product exceeds by 5°C the temperature of the product exiting the reactor."

Claims 2 to 18 of Set D correspond to Claims 2 to 18 as

granted.

VIII. During the oral proceedings, the novelty of the claimed subject-matter in view of D1 was discussed, as well as the allowability of the amendments carried out in the auxiliary requests corresponding to sets A, B and D mentioned above.

(i) The submissions made by the Appellant at the oral proceedings may be summarized as follows:

(i.1) Concerning novelty: While essentially relying on its submissions during the written procedure, it presented the following further arguments:

(i.1.1) From the description of the patent in suit, in particular page 12, lines 45 to 46 and 51 to 56, it was clear that no temperature increase should occur between the moment at which the reaction mixture had exited the reactor and the moment at which the reaction mixture was quenched.

(i.1.2) There could be no doubt that the highest polymerization temperature referred in Claim 1 of the main request meant the highest polymerization temperature in the reactor, otherwise several parts of the description of the patent such as lines 52 to 56 on page 11 would have been meaningless.

(i.1.3) From lines 52 to 56 on page 11, it was clear that there was in fact an implicit objective limitation, implying the decision to proceed to the quenching of the reaction product in view of the target molecular weight and the conversion rate to be obtained having regard to the characteristics of the reaction

product in the reactor and taking into account the temperature conditions required in the transfer lines from the reactor to the quenching zone.

(i.1.4) Thus, it was evident, that the control of the temperature increase between the entry in the transfer line and the quenching zone was essential to the claimed process.

(i.1.5) On the contrary, Example 1 of D1, which was not sufficiently detailed, gave no indication upon what occurred in the transfer lines between the reactor and the collection vessels. In that respect, the polymerization time and the contact time were merely indicated in minutes, and it had been shown in the declaration of Mr W. M. Davis submitted with letter dated 23 July 1998 that a transfer time as short as 21 seconds gave rise to an increase of temperature higher than 5°C.

(i.1.6) Thus, the subject-matter of Claim 1 of the main request was novel over D1.

(i.2) Concerning the allowability of the amendments carried out in the auxiliary request represented by set A.

(i.2.1) Figure 1 of the patent in suit in combination with the description of this figure on page 13, lines 54 to 55 clearly disclosed that the temperature of the reactor content was determined. The Appellant further submitted that the skilled artisan would know at which place in the reactor the temperature should be measured in order to correspond to the highest temperature employed during the polymerization.

(i.2.2) Thus, the corresponding amendment carried out in Set A was allowable.

(i.3) Concerning the amendments carried out in set B and D, it referred to its submissions in the written procedure according to which in a continuous process such as that of Claim 1 of these requests, the highest polymerization temperature would be the temperature of the product exiting the reactor. Furthermore, these amendments found their support on page 12, lines 48 to 56 of the patent in suit and the corresponding part thereof in the application as originally filed.

(ii) The arguments presented by the Respondents may be summarized as follows:

(ii.1) Concerning novelty: While they essentially relied on their submissions made in the written procedure, they also presented the following further arguments:

(ii.1.1) The language of Claim 1 of the main request referred in the first step to contacting the isobutylene feed with the catalyst and in the second step to the immediate quenching of the reaction product.

(ii.1.2) Example 1 of D1 clearly disclosed a reaction residence time of 16 minutes and a contact time of 16 minutes, after which the reaction was terminated by adding a quenching agent. This showed that the quenching was immediately carried out in Example 1 of D1 as required by Claim 1 of the patent in suit.

(ii.1.3) After quenching had begun, there was no

possibility of change of the molecular weight and of the conversion ratio. Thus, the corresponding values of these characteristics would be the same at the end of the contact time and after quenching.

(ii.1.4) The polymerization reaction would continue, until the catalyst had been deactivated. Thus, it would not be possible to distinguish between the reactor per se and the transfer lines. In other words, since the reaction continued in the transfer lines, these transfer lines would be part of the reactor. In that respect, reference was made to lines 37 to 40 on page 11 of the patent in suit.

(ii.1.5) Respondent II also added that the feed used in Example 1 of D1 exhibited a boiling point in the range of 3 to 4 °C under a pressure of 650 mm Hg and that its boiling point would be lowered to -5°C due to the presence of the polybutene polymer in the reactor. It also submitted that the use of millimetres of Hg was restricted in the art to the indication of subatmospheric pressures.

(ii.1.6) The Respondents therefore maintained their view that Claim 1 of the main request lacked novelty in respect of D1.

(ii.2) Concerning the auxiliary request represented by Set A.

(ii.2.1) In addition to their arguments presented in the written procedure, they further submitted that there was no indication in the patent in suit as to whether the thermocouple (3) mentioned in Figure 1 would inevitably indicate the highest temperature

during the polymerization reaction. Furthermore, it would appear that this thermocouple in the reactor of Figure 1 was not located at the exit of the reactor, which according to the submissions of the Appellant, would correspond to highest polymerization temperature. Thus, Claim 1 of set A was not allowable under Article 123(2) EPC.

(ii.3) Concerning the auxiliary request represented by Set B:

(ii.3.1) The feature that the reference temperature for the quenching step should be the temperature when the product exiting the reactor had no support in the application as filed.

(ii.3.2) Furthermore, there was no indication in the patent in suit that the temperature of the product exiting the reactor would inevitably correspond to the highest polymerization temperature.

(ii.3.3) Thus, Claim 1 of this request was not allowable under Article 123 EPC.

(ii.4) Concerning the auxiliary request D: they both argued that this request was filed at a very late stage and should therefore not be admitted into the proceedings.

IX. The Appellant requested that the decision under appeal be set aside and that the patent be maintained as granted (main request) or on the basis of auxiliary request A submitted with the statement of grounds or on the basis of auxiliary request B submitted with letter of 25 March 2002 or on the basis of auxiliary request D

submitted at the oral proceedings, in the alternative that the case be remitted to the Opposition Division for consideration of inventive step on the basis of the main request or of one of the auxiliary requests A, B or D.

The Respondents I and II requested that the appeal be dismissed.

Reasons for the Decision

1. The appeal is admissible.

Main request.

2. *Novelty of Claim 1 of the main request*

- 2.1 The documents cited against novelty in the decision under appeal are documents D1 and D1'. Lack of novelty has been alleged by the Respondents I and II on the basis of the same documents.

- 2.2 Document D1' which is the European Patent application corresponding to document D1 does not add anything to the disclosure of D1. Therefore, there is no need to further consider document D1' for the sake of assessment of novelty of the main request.

- 2.3 D1 refers to a liquid phase process for the cationic polymerization of a feedstock comprising 1-olefins in the presence of preformed complex of BF_3 and an alcohol as catalyst at a temperature between -100°C and $+50^\circ\text{C}$, at a contact time of the polymerization reaction of at least 8 minutes such that at least 70% of the

unsaturation linkages in the polymer product are in the terminal position.

2.4 More specifically, D1 discloses in its Example 1 a continuous process for the manufacture of a polybutene polymer having a number average molecular weight of 955, a vinylidene end group content of 76% based on the total unsaturation. According to this example the process is carried out using a feedstock containing 38% isobutene at a temperature of -5°C , at a reaction pressure of 650 mm Hg, in the presence of 0.019 g mole/Kg of feedstock of a boron trifluoride initiator (i.e. corresponding to 2.8 mmol BF₃ by mole of isobutene) and at a reaction residence time of 16 minutes. The isobutene conversion ratio is 87%. As indicated in Example 1, after a contact time of 16 minutes, the polymerization is terminated by using an excess of acetonitrile which is continuously added to the product collection vessel.

2.5 From the comparison between the reaction residence time and the contact time (ie both indicated in minutes and amounting to 16 minutes), it follows, in the Board's view, that an immediate quenching is carried out in Example 1 of D1. D1, however, does not expressly specify the temperature of the reaction product when quenching begins. Thus, when assessing novelty of the subject-matter of Claim 1 of the main request, this question boils down to the interpretation of the feature set out in step (2) of this claim, ie that the quenching must be carried out before the temperature of the product exceeds by 5°C the highest polymerization temperature employed, and more specifically to the interpretation of the expression "highest polymerization temperature employed".

- 2.6 In that respect, it is necessary to refer to the description of the patent in suit. As indicated on page 11, lines 5 to 13, and further stressed on lines 37 to 42 of the same page, the polymerization time encompasses the time during which the BF_3 catalyst is active, ie up to the moment at which the reaction mixture is quenched. By way of consequence, the expression "highest polymerization temperature employed" would refer to the highest reaction temperature occurring during the thus defined polymerization time in the time frame of 12 to 40 minutes set out in Claim 1.
- 2.7 The Appellant, relying in particular to lines 52 to 56 on page 11 of the patent in suit, has submitted that a distinction should be made between the temperature in the reactor and the temperature in the transfer line between the reactor and the quenching zone, and that the implicit objective intention of the claimed process is to control the temperature in the transfer line in order to obtain the desired target molecular weight of the final product in view of the characteristics of the reaction product exiting the reactor. Thus, according to the Appellant, the highest polymerization temperature employed could only refer to the highest polymerization temperature in the reactor.
- 2.8 This argument cannot be considered as convincing for the following reasons:
- 2.8.1 The passage specifically relied on by the Appellant, ie lines 52 to 56 on page 11, indeed, clearly refers to the polymerization time as defined on the same page (cf. paragraph 2.6 above) and teaches that the polybutene product in contact with the BF_3 catalyst,

which has attained the target molecular weight within this polymerization time is contacted with the quenching medium to deactivate the catalyst.

- 2.8.2 The polymerization time, according to the definition given in the description of the patent in suit for this feature, will inevitably encompass the time in the transfer line between the reactor and the quenching zone, during which the temperature of the reaction mixture is still in the range from -20°C to $+25^{\circ}\text{C}$ within the time frame of 12 to 40 minutes. It thus follows that this part of the transfer line will be a reaction zone, ie a reactor, and that the distinction made by the Appellant is not directly and unambiguously derivable from the description of the patent in suit.
- 2.8.3 In view of lines 16 to 21 on page 25 of the application as filed, it is also evident that the decision to effect immediate quenching is taken when the isobutylene conversion is at least 70%, ie not necessarily at the exit of the reactor, since the polymerization reaction continues in the transfer line, because the catalyst is not deactivated.
- 2.8.4 Even if the attainment of the target molecular weight within the average polymerization time disclosed meant that the decision to quench is taken at some time before the notional polymerization time is finished, no objectively distinguishing technical features in the sense of Rule 29(1) EPC can be associated with the notional decision to quench.
- 2.8.5 Consequently, no distinction can be established between the polymerization time up to the decision to quench, i.e. according to the Appellant, up to the moment at

which the reaction mixture exits the reactor, and the polymerization time up to the point at which quenching actually takes place. On the contrary, the only concrete definition of the polymerization time is the contact time, which leads to the conclusion set out in section 2.8.2, above.

- 2.8.6 Thus, the Board is compelled to accept the interpretation of the Respondents that "the highest polymerization temperature employed" is to be read as the highest temperature in the range -20°C to $+25^{\circ}\text{C}$ reached during a whole polymerization time, including that in the transfer time of 12 to 40 minutes.
- 2.9 By way of consequence, Example 1 of D1 would be novelty destroying for the subject-matter of Claim 1 of the main request, provided it is established that the temperature reached by the reaction product in this example before quenching begins is at most $+30^{\circ}\text{C}$.
- 2.10 As indicated above, Example 1 of D1 does not mention the temperature at which the quenching begins. Nevertheless, the Respondent II and the Appellant have respectively carried out repetitions of Example 1 of D1 (cf. experimental report provided by Respondent II (Opponent II) with its letter of 25 July 1997 and the declaration of Mr W. M. Davis submitted by the Appellant (Patent Proprietor) with its letter of 23 July 1998). While both parties disagree on the process pressure used in Example 1 of D1 (650 mm Hg absolute pressure for Respondent II in contrast to 650 mm Hg gauge pressure for the Appellant) and have hence carried out their tests taking into account their own interpretation of the process pressure, these tests

show that the temperature of the reaction product of Example 1 of D1 before quenching begins is in any case below +30°C.

- 2.11 It follows that Claim 1 of the main request lacks novelty in view of Example 1 of D1 (Article 54 EPC).
- 2.12 Since Claim 1 is not novel, there is no need to investigate whether the subject-matter of Claims 2 to 18 relates to patentable subject-matter, because a request has to be taken as a whole. Thus, the main request of the Appellant has to be refused.

First auxiliary request (Set A)

3. *Amendments*

- 3.1 Claim 1 of Set A differs from Claim 1 as granted by the incorporation of the feature (i) that the highest polymerization temperature employed is "as indicated by temperature measurement of the contents of the reactor".
- 3.2 It is true, as submitted by the Appellant, that in the application documents as originally filed, reference is made to the presence of a thermocouple (3) for temperature measurements of the contents of the specific reactor depicted on Figure 1 (cf. application as originally filed, page 31, lines 26 to 28, Figure 1), but this does not provide, in the Board's view, a support for the amendment (i) for the following reasons:
 - 3.2.1 Firstly, Figure 1 refers to a very specific apparatus and the presence of a thermocouple at a specific

position in this specific apparatus cannot be generalized to other types of reactors (eg tubular reactors).

3.2.2 Secondly, there is no link between the presence of this thermocouple at the position indicated in Figure 1 and the determination of the highest polymerization temperature employed during the polymerization and, thirdly, as indicated above in paragraph 2.8.2, the reaction zone is not restricted to this specific apparatus but may encompass at least a part of the transfer line to the quenching zone.

3.3 Thus, Claim 1 of the first auxiliary request does not meet the requirements of Article 123(2) EPC. Consequently, the first auxiliary request has to be rejected.

Second auxiliary request (Set B):

4. *Amendments*

4.1 Claim 1 of Set B differs from Claim 1 as granted by (i) the indication that the claimed process is a continuous one, and by (ii) the deletion of the reference to the highest polymerization temperature employed and its replacement by the reference to the temperature of the product exiting the reactor in step (2) of the claimed process.

4.2 While amendment (i) is clearly allowable under Articles 123(2) and 123(3) EPC, the allowability of amendment (ii) presupposes that the highest polymerization temperature employed inevitably corresponds to the temperature of the product exiting

the reactor.

- 4.3 In that respect, the Appellant has submitted that in a continuous exothermic process such as that of Claim 1, the highest reaction temperature is equal to the temperature at the exit of the reactor. It has also relied, as support for amendment (ii), on page 12, lines 48 to 50 of the patent in suit and on page 28, lines 11 to 16 of the application as filed.
- 4.4 The passages mentioned by the Appellant, however, merely indicate that, in a continuous process, the quench will be typically performed just after the product exits the reactor but make no link between the highest polymerization temperature employed and the temperature just after the product exits the reactor and there is no evidence on file that, as alleged by the Appellant, the temperature at the exit of the reactor will inevitably correspond to the highest polymerization temperature employed. This allegation is, moreover, contradictory to its own submissions in view of the presence of the thermocouple (3) in the continuous reactor depicted on Figure 1 of the patent in suit, since this thermocouple is clearly not located at the exit of the apparatus but, in contrast, close to the entry of the reactants.
- 4.5 Furthermore, the aim of the claimed process is to avoid an uncontrolled increase of the temperature of the reaction product before quenching and this underlines the fact that a temperature rise may occur at the exit of the reaction zone. Thus, the temperature of the product at the exit of the reactor may be higher than the highest temperature polymerization employed. By way of consequence, amendment (ii) also leads to an

unallowable extension of the protection conferred.

- 4.6 It follows from the above that amendment (ii) does not meet the requirements of Articles 123(2) and 123(3) EPC. Thus, the second auxiliary request must be rejected.

Third auxiliary request (Set D)

- 5 *Procedural matters -Admissibility of the request.*

- 5.1 This request has been submitted at a very late stage, ie at the beginning of the oral proceedings held on 23 April 2002.

- 5.2 According to several decisions of the Boards of Appeal (eg T 153/85 (OJ EPO 1988, 1); T 955/91 of 4 February 1993 (not published in OJ EPO)), a Board may justifiably refuse to consider alternative claims which have been filed at a very late stage, if such alternative claims are not clearly allowable. However, as stated in decision T 577/97 of 5 April 2000 (not published in OJ EPO), the discretion not to admit auxiliary requests should in principle be limited to exceptional cases.

- 5.3 Claim 1 of the third auxiliary request differs from Claim 1 of the second auxiliary request (Set B) only in that it has been further amended by indicating in step (1) that the polymerization is conducted at a pressure from 100 to 500 kPa. Thus, as in Claim 1 of the second auxiliary request, the reference to the highest polymerization temperature employed has been deleted and replaced by the reference to the temperature of the product exiting the reactor in

step (2) of the claimed process.

- 5.4 As stated above, Claim 1 of the second auxiliary request does not meet the requirements of Article 123 EPC. It follows that Claim 1 of the third auxiliary request is not merely "not clearly allowable" but, in contrast, clearly not allowable under the provisions of Article 123 EPC. Thus, in the Board's view, this situation justifies the Board to exercise its discretion not to admit this late filed request.
- 5.5 Consequently, the third auxiliary request is not admitted into the proceedings.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

E. Görgmaier

R. Young