

Internal distribution code:

- (A) [] Publication in OJ
(B) [] To Chairmen and Members
(C) [X] To Chairmen
(D) [] No distribution

**Datasheet for the decision
of 13 September 2006**

Case Number: T 0806/03 - 3.3.03

Application Number: 94202617.0

Publication Number: 0627448

IPC: C08F 4/76

Language of the proceedings: EN

Title of invention:

Supported ionic metallocene catalysts for olefin
polymerization

Patent Proprietor:

ExxonMobil Chemical Patents, Inc.

Opponents:

Innovene Europe Limited
THE DOW CHEMICAL COMPANY
Basell Polyolefine GmbH

Headword:

-

Relevant legal provisions:

EPC Art. 56, 76(1), 100(a), 100(c), 113(1), 123(2), 123(3)

Keyword:

"Inventive step (yes) - problem and solution"
"Opposition grounds - extension of subject-matter - divisional
application (no)"
"Opposition grounds - extension of subject-matter (no)"

Decisions cited:

G 0004/92, T 0912/91

Catchword:

-



Case Number: T 0806/03 - 3.3.03

D E C I S I O N
of the Technical Board of Appeal 3.3.03
of 13 September 2006

Appellant I:
(Patent Proprietor)
ExxonMobil Chemical Patents, Inc.
1900 East Linden Avenue
P.O. Box 710
Linden, NJ 07036-0710 (US)

Representative:
Dew, Melvyn John
ExxonMobil Chemical Europe Inc.
Law Technology
P.O. Box 105
B-1830 Machelen (BE)

Appellant II:
(Opponent)
Basell Polyolefine GmbH
Brühler Straße 60
D-50389 Wesseling (DE)

Representative:
Seelert, Stefan
Basell Polyolefine GmbH
Intellectual Property
Industriepark Höchst, E413
D-65926 Frankfurt (DE)

**Respondent/
Party as of right:**
(Opponent I)
Innovene Europe Limited
Compass Point
79-87 Kingston Road
Staines, Middlesex, TW18 1DT (GB)

Representative:
Hawkins, David George
Innovene Europe Limited
Compass Point
79-87 Kingston Road
Staines, Middlesex TW18 1DT (GB)

**Respondent/
Party as of Right:**
(Opponent II)

THE DOW CHEMICAL COMPANY
2030 Abbott Road
Dow Center
Midland, MI 48640 (US)

Representative:

Marsman, Hermanus Antonius M.
Vereenigde
Postbus 87930
NL-2508 DH Den Haag (NL)

Decision under appeal:

Interlocutory decision of the Opposition
Division of the European Patent Office dated
14 May 2003 and posted on 30 May 2003
concerning maintenance of European patent
No. 0627448 in amended form.

Composition of the Board:

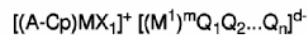
Chairman: C. Idez
Members: A. Däweritz
C. Heath

Summary of Facts and Submissions

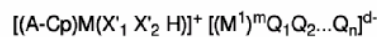
I. The grant of European patent No. 0 627 448 in respect of European patent application No. 94 202 617.0, filed in the name of Exxon Chemical Patents Inc. (later ExxonMobil Chemical Patents Inc.) as a divisional application of the earlier European patent application No. 91 903 112.0 and referring to "(30) Priority: 27.12.1990 US 459921", was announced on 24 November 1999 (Bulletin 1999/47). The earlier European patent application had been filed on 27 December 1990 on the basis of the International Patent Application No. PCT/US90/07669 (published as WO-A-91/09882) and had claimed the priority of 2 January 1990 of an earlier application in the USA (459921). The patent contained four claims reading as follows:

"1. A supported ionic catalyst comprising

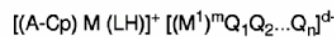
(A)



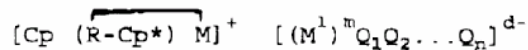
or



or



or

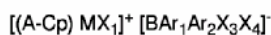


wherein M is a metal selected from the group consisting of titanium, zirconium and hafnium; (A-Cp) comprises (Cp) (Cp*) or Cp-A'-Cp*, and Cp and Cp* are the same or different substituted or unsubstituted cyclopentadienyl radicals; A' is a covalent bridging group; L is an olefin, diolefin or aryne ligand; X₁ is selected from the group

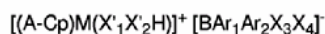
consisting of a hydride radical, hydrocarbyl radical, substituted hydrocarbyl radical and organometalloid radical; X'₁ and X'₂ are joined and bound to the metal atom to form a metallocycle in which the metal atom, X'₁ and X'₂ form a hydrocarbocyclic ring containing from 3 to 20 carbon atoms; and R is a substituent having from 1 to 20 carbon atoms on one of the cyclopentadienyl radicals which is also bound to the metal atom; and wherein M¹ is a metal or metalloid selected from the Groups selected from the Groups subtended by Groups V-B, VI-B, VII-B, VIII-B, II-B, III-A and V-A; Q₁ to Q_n are selected, independently from the group consisting of hydride radicals, dialkylamido radicals, alkoxide and aryloxy radicals, hydrocarbyl and substituted-hydrocarbyl radicals and organometalloid radicals and any one, but not more than one of Q to Q_n may be a halide radical the remaining Q to Q_n being, independently, selected from the foregoing radicals; m is an integer from 1 to 7; n is an integer from 2 to 8 and n-m=d and;

(B) an inorganic oxide catalyst support material in particulate form.

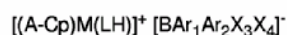
2. A catalyst according to claim 1 comprising:



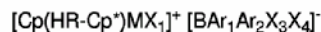
or



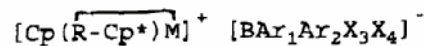
or



or



or



wherein:

B is boron in a valence state of 3;

Ar₁ and Ar₂ are the same or different aromatic hydrocarbon radicals containing from 6 to 20 carbon atoms, said radicals being optionally linked to each other through a stable bridging group; and

X₃ and X₄ are, independently, selected from the group consisting of hydride radicals, halide radicals, hydrocarbyl radicals containing from 6 to 20 carbon atoms and substituted-hydrocarbyl radicals, wherein one or more of the hydrogen atoms is replaced by a halogen atom, containing from 1 to 20 carbon atoms, and hydrocarbyl substitutes organometalloid radicals, wherein each hydrocarbyl substitution contains from 1 to 20 carbon atoms with the proviso that only X₃ or X₄ will be halide at the same time.

3. A supported catalyst according to claim 1 or claim 2 wherein the support is selected from alumina, silica, alumina-silica, talc, magnesia, zirconia, titania or mixtures thereof.
4. A process for producing polymer which comprises polymerising an olefin in the presence of a catalyst according to any of the preceding claims."

In this decision, any references in italics (eg "page 8") refer to the corresponding passage in the divisional application as filed, those in brackets (eg "[0001]") refer to the patent in suit as granted.

II. On 10, 22 and 24 August 2000, respectively, three Notices of Opposition were filed in which revocation of the patent in its entirety was requested on the basis of the grounds according to Article 100(a) EPC and with reference to Articles 52 to 57 EPC. Opponent II additionally based its opposition on Article 100(c) EPC.

(1) The following documents were cited in the Notices of Opposition (numbering as in the decision under appeal):

D1: EP-A-0 277 004,

D2: EP-A-0 206 794,

D3: EP-A-0 232 595,

D4: EP-A-0 279 863,

D5: EP-A-0 295 312 and

D6: P.G. Gassmann and M.R. Callstrom, "Isolation, and Partial Characterization by XPS, of Two Distinct Catalysts in the Ziegler-Natta Polymerization of Ethylene", J.Am.Chem.Soc., Vol. 109 (1987), pages 7875 and 7876.

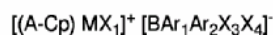
(2) Whilst novelty was not contested by the Opponents, they argued that in view of any combination of D1 with one of documents D2, D3, D4 or D5, respectively, the claimed subject-matter would not be based on an inventive step. Opponent I further assumed that the priority date as referred to on the front pages of EP-A2-0 627 448 and EP-B1-0 627 448 (section I, above) was incorrect. In reply to this assumption and with

reference to Article 76(1) EPC, the Patent Proprietor requested that the priority date be corrected under Rule 88 EPC (letter dated 14 March 2003).

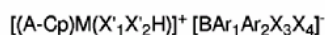
(3) In the course of the opposition proceedings, Opponent II, on the one hand, submitted a test report (letter of 14 March 2003) in order to show that the problem underlying the patent in suit would not be solved in the full breadth of the claims, and the Patent Proprietor, on the other hand, filed five auxiliary requests, each based on a new set of claims (Set A as enclosed to a letter of 8 May 2001, and Sets B to E, all annexed to a letter of 11 April 2003).

The claims of Set D read as follows:

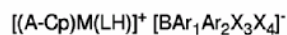
"1. A supported ionic catalyst comprising



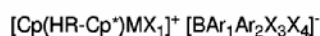
or



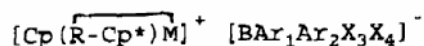
or



or



or



wherein M is a metal selected from the group consisting of titanium, zirconium and hafnium; (A-Cp) comprises (Cp) (Cp*) or Cp-A'-Cp*, and Cp and Cp* are the same or different substituted or unsubstituted cyclopentadienyl radicals; A' is a covalent bridging group; L is an olefin, diolefin

or aryne ligand; X_1 is selected from the group consisting of a hydride radical, hydrocarbyl radical, substituted hydrocarbyl radical and organometalloid radical; X'_1 and X'_2 are joined and bound to the metal atom to form a metallocycle in which the metal atom, X'_1 and X'_2 form a hydrocarbocyclic ring containing from 3 to 20 carbon atoms; and R is a substituent having from 1 to 20 carbon atoms on one of the cyclopentadienyl radicals which is also bound to the metal atom;

wherein:

B is boron in a valence state of 3;
 Ar_1 and Ar_2 are the same or different aromatic or substituted aromatic hydrocarbon radicals containing from 6 to 20 carbon atoms, said radicals being optionally linked to each other through a stable bridging group; and
 X_3 and X_4 are, independently, selected from the group consisting of hydride radicals, halide radicals, hydrocarbyl radicals containing from 6 to 20 carbon atoms and substituted-hydrocarbyl radicals, wherein one or more of the hydrogen atoms is replaced by a halogen atom, containing from 1 to 20 carbon atoms, and hydrocarbyl substitutes organometalloid radicals, wherein each hydrocarbyl substitution contains from 1 to 20 carbon atoms with the proviso that only X_3 or X_4 will be halide at the same time, wherein transfer of a fragment of the anion to the metal cation is avoided i) by steric hindrance resulting from substitutions on the aromatic carbons of the

anion, or ii) by fluorine substitution in the anion; and

(B) an inorganic oxide catalyst support material in particulate form.

2. A supported catalyst according to claim 1 wherein the support is selected from alumina, silica, aluminasilica, talc, magnesia, zirconia, titania or mixtures thereof.

3. A process for producing polymer which comprises polymerising an olefin in the presence of a catalyst according to either of the preceding claims."

(4) Oral proceedings were held before the Opposition Division on 14 May 2003. In this hearing, the parties were informed by the Opposition Division that the correction of the priority date was deemed allowable under Rule 88 EPC. No objections were raised by the opponents in this respect (Minutes of the oral proceedings, item 2).

III. At the end of the oral proceedings, the Opposition Division announced an interlocutory decision, which was issued in writing on 30 May 2003.

(1) In this decision, the Opposition Division established that (i) the Patent Proprietor had informed the EPO, on 30 March 2001, about a change of its name (which had, according to a Communication dated 19 April 2001, taken effect on 22 March 2001) and (ii), the EPO had been informed by Opponent III (letter dated 10 March 2003 with annexed copies of the respective

official documents) about a change of its legal status (the decision under appeal: Nos. I.8 and 9).

(2) With regard to the objections raised by the opponents, it was held that the Auxiliary Request on the basis of the above Set D complied with Articles 123(2) and 84 EPC, and additionally fulfilled the requirements of Article 56 EPC. Consequently, the Opposition Division came to the conclusion that the patent documents in this amended form did not prejudice the maintenance of the patent in suit. Concerning Article 123(2) EPC, it was held that, in several passages of the description (*page 18, lines 20 to 30, page 19, lines 13 to 21 and 29 to 32*), support would be found for the formation of ionic pairs in the reaction of the metallocene component with a boron-containing activator which was prevented from transferring a fragment from its anion to the metal cation, either by steric hindrance resulting eg from substitutions on the aromatic carbon atoms of the anion or by fluorine substitution in the anion, rendering the anion more resistant to degradation (No. II.3.1 of the reasons).

(3) By contrast, the higher ranking requests, which were based on the claims as granted and on Sets A to C, respectively, (sections I and II(3), above) were found to violate the requirements of Article 123(2) EPC.

(4) With regard to the objection of Opponent II, that the envisaged technical problem would not be solved in the whole breadth of the claims, and to the test report submitted by this Opponent (section II(3), above), the decision under appeal held that, as far as the embodiments encompassed by Set D were concerned, the

balance of probabilities pointed towards the position of the Patent Proprietor, and it was decided accordingly in favour of the Patent Proprietor.

According to the Patent Proprietor, the teaching of the patent in suit had not been followed in the test report in regard to a number of process measures, including modification of the calcination step and inappropriate drying methods of the support material and (as contested by Opponent II) a lack of controlled conditions in the polymerisation reaction (No. II.3.3.1 of the reasons).

(5) Document D1 was considered to represent the closest state of the art, because it disclosed the same ionic catalyst system, however in unsupported form.

The technical problem to be solved with regard to this document was seen in the provision of a modification of the catalyst system of D1, which was to be suitable for its use in gas or slurry phase polymerisation, whilst maintaining the benefits of the catalyst system as described in D1. These benefits were the production of a polymer having a high molecular weight (MW), narrow molecular weight distribution (MWD) and composition distribution (CD) and good comonomer incorporation.

The solution was seen in the provision of the catalyst supported on an inorganic oxide in particulate form as claimed in Claim 1 of Set D.

The skilled person would not have combined D1 with any one of D2 to D5 to arrive at the present solution, as

all these latter secondary documents showed the necessary presence of alum(in)oxane (AlOx).

Nor would the skilled reader, when starting from any one of D2 to D5, have easily given up the presence of AlOx, considered to be a key feature of the catalysts in these documents, and would, instead, have turned to D1 and its catalyst system using non-coordinated anions as cocatalysts. No incentives would have been found in any one of D2 to D5 to combine their teaching with that of D1. Consequently, it was held that the claimed subject-matter was also based on an inventive step.

- IV. On 24 July 2003, a Notice of Appeal was filed by the Patent Proprietor/Appellant I with simultaneous payment of the prescribed fee. Appellant I requested that the patent in suit be maintained as granted.

In the Statement of Grounds of Appeal received on 12 September 2003, Appellant I disputed the reasons of the decision dealing with the Main Request (the claims as granted) and the first to third Auxiliary Requests corresponding to Sets A to C, respectively, (sections I and II(3), above) and maintained these requests.

- V. On 29 July 2003, a Notice of Appeal was filed by Opponent III/Appellant II with concomitant payment of the prescribed fee. In its Statement of Grounds of Appeal received on 23 September 2003, Appellant II raised objections under Articles 123(2) and 56 EPC against the patent in suit as maintained by the Opposition Division.

(1) Thus, Appellant II was of the opinion that aspect (ii), which referred to the fluorine substitution in the anion within the amendment of Claim 1 of Set D as depicted in section II(3), above, would have no basis "in den ursprünglich eingereichten Unterlagen, d.h. in der PCT-Anmeldung WO 91/09882" (in the application as originally filed, i.e. the PCT application WO 91/09882). In particular, the fluorine substitution, mentioned in the application text, would not necessarily refer to "the transfer of a fragment of the anion to the metal cation", but concerned an improvement of the anion by rendering it "more resistant to degradation". However, it could not be derived from that text that these two expressions would have the same meaning. Rather, the latter much more general statement would encompass all sorts of degradation of the anion, not only the transfer of a fragment to be prevented. Therefore, a direct link between the fluorine substitution of the anion and the avoidance of such a transfer could not unambiguously be derived from the passage of the description referred to in the decision under appeal in this respect (Statement of Grounds of Appeal II: 2nd half of page 1 and 1st half of page 2).

(2) Furthermore, with regard to the reasoning in the decision under appeal concerning the issue of inventive step, Appellant II took the view that either D1 or D2 or D5 could be considered as the closest piece of the state of the art.

The technical problem to be solved with regard to D1 was seen in making the known catalyst system of D1 suitable for the use in the gas phase or slurry polymerisation and to obtain products having a narrow

particle size distribution and (coupled therewith) a high bulk density. Moreover, the reactor fouling was to be significantly reduced. However contrary to the decision under appeal, Appellant II was of the opinion that D5 would make the solution of the above problem obvious. Thus, D5 would disclose the same metallocenes (MC) as those used in D1 and in the patent in suit, which, in D5, were activated by means of AlOx.

Document D5 would deal with the same problem as the patent in suit, viz. the achievement of high bulk density and excellent powder characteristics of the product and high polymerisation activity, and solved this problem by providing the catalyst with a carrier, such as porous oxides, i.e. the same means were used in D5 as in the patent in suit, even in gas phase polymerisation (D5: Example 1).

Starting from D5, the only difference would be in the activation of the supported MC by means of certain boron compounds instead of the AlOx as in D5. The allegation in the decision under appeal, that the key feature would not easily be given up, had not, in the opinion of Appellant II, been proved. Nor were any hints found by the Appellant that the methods of providing a support for the catalyst would be limited to those comprising an AlOx and that the skilled person would be advised against using such a support for other catalyst systems. No fundamental difference had been demonstrated by the Opposition Division. It would be a complete mystery why the skilled person would, in any case, rely on AlOx although, eg from D1, more elegant ways of MC activation had been known, and the

disadvantages of the activation by means of AlOx had been summarised in D1.

VI. In a letter dated 29 January 2004, Appellant I disputed these arguments of Appellant II and pointed *inter alia* out that the properties of the polymer had been improved as demonstrated by the examples in the patent in suit and that the arguments of Appellant II concerning inventive step would clearly be based on hindsight.

VII. By letter dated 9 February 2004, Opponent II, who is a party as of right, disputed the above arguments of Appellant I (section IV, above) and requested that the appeal of Appellant I be dismissed or, alternatively, that the case be remitted to the first instance. Furthermore, it referred to its test report (section II(3), above) and supported the arguments of Appellant II.

VIII. In a further letter dated 27 May 2004, Appellant II also disputed the arguments of Appellant I with regard to the Main Request and the higher-ranking requests (Sets A to C; section IV, above) and reiterated its previous arguments.

IX. On 30 June 2006, summons to oral proceedings, which had been requested by both Appellants, were sent out.

(1) In reply to the summons, Appellant I withdrew, in a letter dated 18 July 2006, its previous Main Request and its first to third Auxiliary Requests (Sets A to C), but, as a precaution to ensure freedom to pursue claims broader than Set D, it maintained *expressis verbis* its

appeal. In other words, the new Main Request of Appellant I corresponded to the version of the patent as maintained in the decision under appeal. Furthermore, Appellant I submitted new first to third Auxiliary Requests, comprising Sets of claims D', E and F, respectively.

Moreover, it requested that the test report of Opponent II (who had not filed an appeal) and the additional arguments of this Opponent concerning the patent as maintained (sections II(3) and VII, above) should be excluded from consideration in the appeal proceedings.

(2) According to a transfer agreement acknowledged by an official Communication dated 12 July 2006, a new Opponent became the successor of previous Opponent I and, as a Party as of right, gave notice by letter of 1 August 2006 that it would not attend the hearing.

(3) By fax received on 8 August 2006, Appellant II (Opponent III) withdrew its request for oral proceedings and informed the Board that it would not attend the hearing. Its request that the patent in suit be revoked in its entirety was, however, maintained.

(4) Opponent II, i.e. the other Party as of right, also informed the Board in a letter dated 16 August 2006, that it would not take part in the hearing, and requested that its test report and its further arguments (cf. section IX(1), above) should be taken into account.

X. On 13 September 2006, the oral proceedings were held as scheduled with Appellant I attending, but, as announced, in the absence of Appellant II and of the other Parties as of right. The discussion in the hearing focused on the Main Request of Appellant I/the Patent Proprietor.

(1) At the beginning, the Board remarked that Claim 1 of this Main Request did not comply with Article 123(2) EPC, because of the common definition of radicals X_3 and X_4 referring to "hydrocarbyl radicals containing from 6 to 20 carbon atoms", the lower limit of which range had no basis in the divisional application as filed.

(2) In view of this objection, Appellant I replaced this Main Request by a new version wherein, as the sole amendment, the lower limit of the range mentioned in section X(1), above, was replaced so that the definition concerned then read "hydrocarbyl radicals containing from 1 to 20 carbon atoms".

(3) As to the objection of Appellant II under Article 123(2) EPC (section V(1), above), Appellant I referred to the last paragraph on *page 19, line 13 et seq.* and pointed out that the particulars in the disclosure of this paragraph should be seen together, instead of being dissected as had been done by Appellant II. The essence of this disclosure was, in Appellant I's view, to stabilise the cation by an anion, but thereby to prevent any coordination step at the MC cation, in particular by transfer of a fragment of the anion to the cation. The less preferred possibility to avoid such a transfer was imparting steric hindrance by substitution of the Cp (cyclopentadienyl) ligands of the MC component. Instead, the anion could be rendered

bulky enough to achieve this goal by substituting its aromatic carbon atoms. This substitution increased the resistance of the anion to degradation (wherein fragments would be formed which could be transferred) by imparting steric hindrance or by fluorine-substitution in the anion. Therefore, Appellant I took the view that Article 123(2) EPC was complied with. Moreover, since each of these measures meant a limitation of the subject-matter claimed, the requirements of Article 123(3) EPC would also be met.

(4) As to the test report of Opponent II, Appellant I pointed out that the Opposition Division had relied not only on the written submissions of Opponent II, but had additionally heard its technical expert in a hearing, before it came to the conclusion that the test report had not convincingly established that the technical problem underlying the patent in suit would not be solved in the full breadth of the claims, as alleged by Opponent II. Moreover, the onus of proof had been and still was on Opponent II to prove its allegation in this respect, but neither the same submissions as before the Opposition Division, nor additional arguments had been provided by the Opponents, namely with regard to the Main Request on the basis of Set D. Nor had the Opponents appeared in the oral proceedings to do so. As to the substance of those experiments, Appellant I further argued that Opponent II had chosen process conditions which did not give reliable results. Therefore, the Board should not, according to the Appellant, take the results of the test report into account.

(5) However, having regard to the fact that the test report (section II(3), above) had already been admitted to the opposition proceedings, the Board took the view that the report could not be withdrawn from consideration and informed Appellant I accordingly.

(6) With regard to inventive step, Appellant I acknowledged D1 to be the closest piece of prior art, because, as admitted in paragraph [0001], the homogeneous variant of the ionic catalyst had been known from that document. It was also accepted by the Appellant that heterogeneous catalysts were preferred in the art, since homogeneous systems were, in general, used only for polymer specialties, but not for polymer commodities, so that there was an incentive to provide heterogeneous catalyst system, which should not, however, give poorer results in respect of the advantageous properties of the polymers attainable by using the homogeneous catalyst. Rather, it would have been desirable additionally to increase the bulk density of the products, as was, in fact, achieved, as shown by the comparison in Example 2 of the patent in suit. With regard to the Opponents' argument that the use of the same support materials in catalysts for the preparation of polyolefins had already been known and that, therefore, their use in the present system would have been made obvious by any one of D2 to D5, namely to increase the bulk density, Appellant I put emphasis on the different types of the catalyst systems, considered to be fundamental, as in all of documents D2 to D5 the MC was activated by means of AlOx, which additionally played an important role (was "a vital element") in those systems as a scavenger for inevitable impurities.

Moreover, the addition of a support was not as simple as it might have appeared in view of those known supported catalysts, because it was not simply the addition of an inert entity to the catalyst. Rather, it had to be pre-treated to be suitable for the intended purpose.

- XI. Appellant I requested that the decision under appeal be set aside and that the patent be maintained on the basis of the Main Request as filed in the oral proceedings, in the alternative on the basis of Set of Claims D' submitted with letter dated 18 July 2006, or on the basis of the Set of Claims E submitted with letter dated 11 April 2003, or on the basis of the Set of Claims F submitted with letter dated 18 July 2006.

According to its written submissions, Appellant II requested that the decision under appeal be set aside and that the patent be revoked in its entirety.

Reasons for the Decision

1. Both appeals are admissible.
2. *Procedural matters*
 - 2.1 In view of the fact that all parties had been summoned to the oral proceedings in due time (section IX, above), the Board decided to continue the proceedings in the absence of Appellant II and of the other Parties as of right (Opponents I and II) in accordance with Rule 71(2) EPC.

2.2 On the one hand, Article 100(c) EPC had been a ground for opposition initially invoked by Opponent II (Notice of Opposition: page 2, cf. section II, above). On the other hand, Appellant I, when limiting its requests in its letter dated 18 July 2006, nevertheless maintained its appeal "as a precaution to ensure freedom to pursue claims broader than set D" (section IX(1), above). This information had been made available to the other parties by communication dated 24 July 2005, i.e. more than one month before the oral proceedings (Rule 78(2) EPC), which gave them the opportunity to reconsider their intentions concerning the case in good time before the oral proceedings.

Whilst, according to the Opinion of the Enlarged Board of Appeals G 4/92 (OJ EPO 1994, 149), a decision against a party, which has been duly summoned but fails to appear at oral proceedings, may not be based on facts or evidence put forward for the first time during those oral proceedings (Conclusions 1 and 2), the Enlarged Board also emphasised in No. 4 of the reasons that, in accordance with Rule 71(2) EPC and in the interests of the proper administration of justice, no party should be able to delay the issue of a decision by failing to appear at the oral proceedings. In this respect, the Board follows the view expressed in T 912/91 of 25 October 1994 (No. 10 of the reasons; not published in OJ EPO):

"Finally, the Board finds that considering and deciding in substance on the maintenance of the patent on the basis of the present claims as amended during oral proceedings in the absence of two of the Opponents does

not conflict with the decision of the Enlarged Board of Appeal G 4/92 (OJ EPO 1994, 149). According to this decision, a party who fails to appear at oral proceedings must have the opportunity, in accordance with Article 113(1) EPO, to comment on new (and therefore surprising) facts and evidence submitted in those proceedings. The submission during oral proceedings of auxiliary requests is, clearly, neither a 'fact' nor can it be 'evidence' within the meaning of the above decision, so that that decision does not apply in such a case. Were it otherwise, no decision could ever be issued at the end of an appeal hearing where, as is usually the case, auxiliary requests are filed and, as is also frequently the case, one or more of the Opponents does not attend the hearing. This would render such hearings pointless, as well as offend the general principle of legal certainty, i.e. the general interest of the public in the termination of legal disputes ('expedit reipublicae ut sit finis litium').

On the basis of the above facts and findings, the Board came to the conclusions that amendments carried out in the claims before grant and still contained in the sets of claims submitted later by Appellant I had also to be considered in the oral proceedings with regard to the requirements of Article 123(2) EPC, irrespective of the absence of several parties in the hearing, and that all the parties must have expected that these questions would be discussed. Therefore, the requirements of Article 113(1) EPC are met.

3. *The decision under appeal*

3.1 As already mentioned above, one of the grounds for opposition relied upon and substantiated by the Opponents with regard to the patent in suit, which was derived from a divisional application, had been based on Article 100(c) EPC.

3.2 With regard to the Main Request of the Patent Proprietor in the opposition proceedings, which was directed to the maintenance of the patent as granted, the Opposition Division decided that Article 123(2) EPC had not been complied with in comparison with "the application as originally filed, which is the parent application WO91/09882" (No. II.1.1 of the decision under appeal).

3.2.1 As this Main Request is no longer maintained by Appellant I (section IX(1), above), it is not subject-matter to be dealt with in this decision. This finding is also valid for the auxiliary requests on the basis of Sets A to C, mentioned in sections II(3) and IV, above, which were withdrawn at the same time.

3.2.2 Nevertheless, the Board observes with regard to the passage of the decision under appeal referred to above, that the subject-matter of a European patent must not extend (i) beyond the content of the application as filed, or (ii), if it was granted on a divisional application (or on a new application filed in accordance with Article 61 EPC), beyond the content of the earlier application as filed (cf. the wording of Article 100(c) EPC). Aspect (i) is governed by Article 123(2) EPC, aspect (ii) by Article 76(1) EPC.

Hence, in the present case, Article 123(2) EPC provided the basis for examining the allowability of amendments of the subject-matter of the divisional application No. 94 202 617.0 carried out *during its examination* in comparison with the initial text of this divisional application as filed on 12 September 1994 (aspect (i), as above), whereas the comparison of the text of the granted patent with WO-A-91/09882 (the text of the parent application) should have been based on Article 76(1) EPC (aspect (ii), as above).

The reference in the decision under appeal to the wrong Article made, however, no difference with regard to the substance of the decision on the Main Request at issue in the opposition proceedings (No. 1.1 of the reasons for the decision under appeal), since the descriptions of the parent application as published in WO-A-91/09882 and of the divisional application as filed were identical.

Main Request of Appellant I

4. *Wording of the Claims*

4.1 For the reasons given in section 2.2, above, the Main Request as identified by Appellant I in its letter dated 18 July 2006 (section IX(1), above) and as still maintained at the beginning of the oral proceedings, had to be considered by the Board with regard to the requirements of Article 123(2) EPC.

Claim 1 of this set of claims was based on a combination of features contained in the granted

version of Claims 1 and 2, respectively, whereby the common definition of radicals X_3 and X_4 as contained in the anion was derived from granted Claim 2 (sections I and II(3), above), which had been "made consistent with the text on page 14" (letter dated 14 April 1997, page 1, third paragraph) in reply to a communication of the Examining Division before grant.

4.2 In order to meet the objection raised by the Board under Article 123(2) EPC (section X(1), above), a new Main Request was filed in the oral proceedings (section X(2), above). It differs from the replaced former version only by the wording of Claim 1. In this claim, the previous formulation in the common definition of radicals X_3 and X_4 which referred to "hydrocarbyl radicals containing from 6 to about 20 carbon atoms" was replaced by "hydrocarbyl radicals containing from 1 to about 20 carbon atoms".

4.2.1 This new range has its basis on *page 14, lines 16/17*. Therefore, Claim 1 of the new Main Request complies with Article 123(2) EPC.

4.2.2 Having regard to Claim 1 as granted (section I, above), it is evident that the incorporation of the features of Claim 2 as granted in Claim 1, albeit in extended form (referring to a range of C_1 to C_{20} instead of C_6 to C_{20}) (cf. sections I, II(3) and X(2), above), comes down to a limitation of the scope of protection conferred by the patent in suit. The new Claim 1, therefore, does not violate Article 123(3) EPC in this respect.

4.3 Furthermore, Appellant II had objected to the additional feature in the definition of the anion in Claim 1 as maintained (sections II(3), III(2) and V(1), above), because this wording was not, in its opinion, supported by the application as originally filed. The relevant passage on *page 19* read as follows:

"With respect to the combination of the metallocene component with the activator component to form a catalyst of this invention, it should be noted that the two compounds combined for preparation of the active catalyst must be selected to avoid transfer of a fragment of the anion, particularly an aryl group, to the metal cation, thereby forming a catalytically inactive species. This can be done by steric hindrance, resulting from substitutions on the cyclopentadienyl carbon atoms as well as substitutions on the aromatic carbon atoms of the anion. It follows, then, that the metallocene components comprising perhydrocarbyl-substituted cyclopentadienyl radicals could be effectively used with a broader range of activator compounds than could metallocene components comprising unsubstituted cyclopentadienyl radicals. As the amount and size of the substitutions on the cyclopentadienyl radicals are reduced however, more effective catalysts are obtained with activator compounds containing anions which are more resistant to degradation, such as those with substituents on the ortho positions of the phenyl rings. Another means of rendering the anion more resistant to degradation is afforded by fluorine substitution, especially perfluoro-substitution, in the anion. Fluoro-substituted stabilizing anions may, then, be used with a broader range of metal compound (first components). Activators in which the anions comprise

pentafluorophenyl groups are preferred for preparing ion-pair metallocene catalysts of this invention."

4.4 This disclosure can be summarised as follows:

When reacting the MC and the activator compounds with one another, there is a danger of forming catalytically inactive species, caused by the transfer of a fragment of the anion to the cation. Such a transfer of a fragment, particularly an aryl group, can only be the result of the degradation of the anion. Therefore, such a degradation must be avoided.

This goal can be achieved by substituting either the Cp ligand(s) of the MC or the aromatic carbon atoms of the anion, in particular in the ortho-position of phenyl rings. In this way, *steric hindrance* is achieved, which prevents the transfer of a fragment of the anion (after its degradation) to the cation. Another way of increasing the resistance of the anion against degradation is its fluorine-substitution.

Amongst the above possible choices, more effective catalysts are obtained with activator compounds containing anions being more resistant to degradation.

In view of these findings, the Board is satisfied that both aspects of the additional feature of Claim 1 (indicated by (i) and (ii), respectively, see sections II(3), IX(1) and X(2), above) comply with Article 123(2) EPC.

This amendment also clearly results in a limitation of the scope of protection conferred by Claim 1 as granted,

so that the requirements of Article 123(3) EPC are also complied with.

- 4.5 Consequently, the requirements of Articles 123(2) and 123(3) EPC are met by the new Main Request.

Furthermore, in view of the fact that the descriptions of the application as filed and of the parent application as published in WO-A-91/09882, including in particular those passages referred to above with regard to Article 123 EPC, are identical, the Board has come to the conclusion, also with regard to Article 76(1) EPC, that the objection under Article 100(c) EPC raised in the opposition proceedings cannot prevail.

5. *Problem and solution*

- 5.1 The patent in suit concerns a catalyst system for the polymerisation of olefins in gas phase or slurry polymerisation on the basis of an ionic catalyst system, the homogeneous version of which has been known from D1, as admitted by Appellant I.

- 5.2 Apart from ion pair catalysts corresponding to any one of the formulae in Claim 1 (cf. section II(3), above; patent in suit: Claim 2 as granted and D1: page 8, lines 27 to 37), document D1 additionally refers to solid catalytically active zwitterion-type compounds. Such compounds were formed by decomposition of a number of unstable ionic catalysts prepared eg from peralkyl-Cp-MC and tetra-phenyl- or tetra-(para-alkyl)phenyl-borate compounds (D1: page 8, line 63 to page 9, line 26; Examples 1, 4, 10 and 22). The objects to be achieved in D1 were good control of MW and MWD, no

activation equilibrium, no need for an undesirable cocatalyst and increased comonomer incorporation (D1: page 3, lines 6 to 12).

- 5.3 When accepting D1 as the closest state of the art (as acknowledged in the decision under appeal and by Appellant I; sections III(5), and X(6), above; and as accepted as one possible starting point for the assessment of inventive step by Appellant II, section V(2), above), the technical problem to be solved with regard to D1 may be seen in the provision of a heterogeneous catalyst suitable for gas phase and slurry polymerisation, which reduces reactor fouling and provides polymers having a higher bulk density than the homogeneously catalysed polymerisation of D1 without impairing the other properties achieved in the homogeneously catalysed polymerisation, namely high molecular weight, narrow molecular weight distribution and composition distribution, good comonomer incorporation, good sequence distribution and controlled particle size (cf. [0010] and Statement of Grounds of Appeal of Appellant II: page 2, 2nd half; section V(2), above).
- 5.4 Whilst Appellant I had argued in its letter dated 29 January 2004 (item 3.3 "Surprising effect", section VI, above) that these goals had been attained in the examples of the patent in suit, Opponent II (being a Party as of right) referred again to its test report and argued against the reasons in the decision under appeal (sections II(3), VII and IX(4), above), wherein reference had been made to credible doubts with regard to the results in the test report, that "The invention claimed is in no way limited to a particular

support or a particular method to bring the catalyst on a support". Moreover, Opponent II took the view that its own conclusions drawn in that report "are applicable and prove that whatever the problem underlying the patent is, it is not solved over the full scope of the claims" (letter dated 9 February 2004, page 7, 2nd and 3rd paragraphs).

5.5 In paragraphs [0030] to [0032], explanations are given concerning the chemical composition of support material and the requirements to be fulfilled by such carriers. In particular, the importance of removal of moisture and of surface hydroxyl groups is underlined there ([0030]: "... subjected to a thermal treatment in order to remove water and reduce the concentration of the surface hydroxyl groups"; [0031]: "Chemical dehydration converts all water and hydroxyl groups on the oxide surface to inert species."; [0032]: "... has been thermally or chemically dehydrated such that it is substantially free of absorbed moisture"). In view of these statements, it is evident to the Board that the content of water and/or OH-groups of the support material affects the activity of the catalyst and that the specific conditions to be maintained in the treatment of the support material before it is used depend *inter alia* on its chemical nature.

5.5.1 This question was apparently discussed in depth in the hearing before the Opposition Division (Minutes of 14 May 2003: 2nd half of page 3, item 5, and page 4, 1st and 2nd paragraphs; and decision under appeal: item II.3.3.1, in particular the paragraph bridging pages 6 and 7). It follows therefrom that, whilst it had been asserted in the report that the support treatments had

corresponded to those described in Examples 1, 4 and 14 of the patent in suit, there were significant departures from those process steps as disclosed in these examples (cf. test report: page 2).

5.5.2 Thus, whilst, in Example 1, basic alumina had been dried at 100°C under vacuum, treatment (i) started from a commercial silica heated at 100°C in air before vacuum was applied; in treatment (ii) a large quantity of the oxide had been dried in a tube furnace for a limited time, it is not evident to the Board that the water had been removed to a similar extent as in Example 4, nor that the concentration of the surface hydroxyl groups had accordingly been reduced. In treatment (iii), allegedly corresponding to Example 14, the amount of the organoaluminium added was based on an assumption about the surface OH content of the calcined silica. Neither is the basis of this assumption evident to the Board, nor can it be excluded that, when the whole water adsorbed by the inorganic oxide material and all hydroxy groups of the oxide had been converted to inert species, an excess of the aluminium compound was left behind, which would have also had an effect on the polymerisation.

Further explanations to the test report to overcome the objections in the decision under appeal have not been given by the opposing parties in writing, nor have they attended the oral proceedings before the Board where it might have been possible to elucidate these issues.

In any case, the onus of proof for the assertion that the problem was not solved in the full scope of the

claims has been on the Opponents who have not convincingly discharged this burden.

5.6 Nor are any experimental data available, which would challenge those results provided by the examples of the patent in suit. In particular, Example 2 demonstrates that the use of a supported catalyst resulted in a significant increase of the bulk density.

5.7 In view of these facts and findings, the Board has no reason to come to a conclusion with regard to the above test report of Opponent II different from that in the decision under appeal. Nor is it in a position to refute the arguments of Appellant I in its letter dated 29 January 2004 (sections VI and 5.4, above) that the different aspects of the relevant technical problem (section 5.3, above) were indeed solved by the catalyst as defined in Claim 1 when used in the polymerisation process of Claim 3.

6. *Inventive step*

It remains to be decided whether the claimed solution of this problem derives in an obvious way from the cited documents.

6.1 Although including catalytic active compounds having the same chemical formula as those represented by the general chemical formulae in Claim 1 (section 5.2, above), D1 refers nowhere to heterogeneous catalysts *supported on an inorganic oxide carrier* which was suitable for use in gas phase or slurry polymerisation. Rather, only different generations of unsupported homogeneous catalyst systems of the prior art, reaching

from Ziegler-Natta to MC/alumoxane catalysts, and the homogeneous ionic catalyst claimed therein, have been considered in the document.

All these catalysts were soluble in the polymerisation mixture with one exemption in Example 9, wherein mention is made of polyethylene obtained by means of a yellow precipitate suspended in toluene (apparently in a slurry polymerisation using a solid catalyst). This precipitate had been obtained in Example 8 from tri(n-butyl)ammonium tetra(o-tolyl)boron and bis(Cp)zirconium dimethyl. However, no further particulars can be derived from either example about the structure of the precipitate or about the polymer obtained.

In view of these facts and findings, the Board cannot derive any hint in D1 pointing to a solution of the above relevant problem, let alone to the solution as defined in Claim 1, and, therefore, takes the view that the document itself cannot make the subject-matter of Claim 1 obvious.

- 6.2 Amongst the further documents cited by the Opponents, specific reference was made by Appellant II to D5 (section V(2), above). It relates to a solid catalyst for olefin polymerisation comprising (A₁) a compound of a transition metal of Group IVB of the Periodic Table, (A₂) an AlO_x and (A₃) a particulate organic or inorganic compound carrier in specific atomic ratios (Claim 1), and it relates to a process for forming this catalyst (Claim 7). Whilst the transition metal compound was further specified in Claim 3, the support material was referred to in all claims of D5 as a "particulate organic or inorganic compound carrier".

In view of this wording in the claims of D5, the Board cannot concur with the approach of Appellant II in its Statement of Grounds of Appeal, who criticised the decision under appeal for considering the AlOx as "a key feature for achieving an active metallocene polymerisation catalyst" in D5. In the Board's view, it is clearly the AlOx which is the only fixed feature within the definition of the claimed subject-matter of D5, leaving no room for variation in this respect. Hence, it is unimportant for the question to be decided here that Appellant II had not found any hint in the literature that the methods of supporting mentioned in D5 should be limited to AlOx systems (Statement of Grounds of Appeal: page 4, 2nd paragraph: "Zunächst haben wir in der Literatur keinen Hinweis gefunden, dass die in D5 genannten Trägerungsmethoden auf Aluminioxansysteme beschränkt sein sollten ..."; section V, above), because the decisive question is whether it was obvious to solve the relevant technical problem by using a particulate inorganic support in an ionic catalyst system, formed according to one of the formulae in Claim 1 of the Main Request (sections II(3) and X(2), above) and whether there was a hint derivable from the disclosure of D5 to this end.

Although the description of D5 discloses that metal compounds containing at least one Cp ligand (Claim 3) and the particulate carrier might be organic or inorganic (page 12, last two lines), that inorganic oxides were preferred as the inorganic compound carrier (page 13, lines 24 to 31) and that high bulk density could be achieved by using the catalyst of D5, the Board has not found any reason in the document to

replace its essential component AlOx and, thus, to use a completely different catalyst system.

6.3 The catalyst of D4 differs from that in D5 by an additional mandatory olefin prepolymerisation step, otherwise the features of its catalyst before this additional step are essentially the same as in D5. Thus, apart from the prepolymerisation, this catalyst is also composed of a transition metal compound supported on a carrier and an AlOx. The transition metal compound may have (as in D5) Cp ligands and may additionally be treated with an organic metal compound before it is contacted with the support (Claim 3; page 12/13), which may be a porous inorganic oxide (Claim 7). As in D5, the only component, the presence of which is unambiguously required in all its embodiments, is the AlOx. Consequently, the arguments in the previous section are also valid for this document.

6.4 The essential requirement of D3 is a supported catalyst component treated with at least one MC and at least one non-MC transition metal compound (Claim 1), which according to Claim 12 is used together with a cocatalyst comprising (a) an AlOx and an organometallic compound of a metal of Groups IA, IIA, IIB or IIIA of the Periodic Table. The support may be any solid, particularly porous support such as talc or an inorganic oxide or a resinous support material eg a polyolefin. The preferred material is an inorganic oxide in finely divided form (page 5, last paragraph).

In order to obtain polymers having an improved particle size and bulk density (not necessarily referring simultaneously to narrow particle size distribution and

high bulk density) and also to obtain polymers having varied ranges of MWD and/or CD, this document thus teaches, in essence, to combine a MC/AlOx catalyst with a Ziegler-Natta catalyst, in supported form. Nowhere in the document are any hints to be found which would give an incentive to delete the Ziegler-Natta and the AlOx components. Therefore, although referring to the aspect of improved particle size and bulk density, D3 goes in the direction of a completely different solution and, rather, leads the skilled reader away from the solution found in the patent in suit.

- 6.5 Document D2 relates to an olefin polymerisation supported catalyst comprising the reaction product of at least one MC of a metal of Group 4b, 5b and 6b of the Periodic Table and an AlOx, whereby the reaction product is formed in the presence of a support. Thus, like D3, D4 and D5, it also positively requires the presence of an AlOx, even though "without the presence of the objectionable excess of alumoxane as required in the homogeneous system" (page 3, lines 13 to 15). Although D2 also refers to a support which may preferably be an inorganic oxide in finely divided form, optionally pre-treated by dehydration (Claim 2; page 4, lines 26 to 29 and page 5, paragraph 2) and the catalyst may be used in solution, slurry and gas phase polymerisations (page 11, line 26 *et seq.*), the requirement that an AlOx be used cannot be dispensed with, in particular in view of the fact that, according to the examples, the AlOx acts not only as an activator but also as a scavenger, as pointed out by Appellant I (section X(6), above).

6.6 In view of these facts and findings, the Board cannot see any reason to consider the AlOx as not being a key feature of the subject-matter of each of D2 to D5, which should be replaced by something else in order to overcome the above relevant technical problem, in particular having regard to the teachings in D3 and D5, according to which the problem of improved bulk density could already be solved with MC/AlOx catalyst systems. Any suggestion to replace the AlOx can only be based on the knowledge of the patent in suit, i.e. an inadmissible *ex-post facto* analysis.

Nor could be expected, let alone derived from any one of D2 to D5, that the ionic catalyst of D1 would be compatible with the oxide carrier, so that an active catalyst would be obtained which would solve the above relevant technical problem (section 5.3, above).

In the Board's view, these conclusions are valid irrespective of whether D1 or any one of D2 to D5 is used as the starting point for the assessment of inventive step.

Therefore, the subject-matter of Claim 1 is not made obvious by any one of the documents, relied upon by the Opponents, i.e. by Appellant II and the other Parties as of right, individually or in combination with one another.

7. By the same token, these findings are also valid for the process of Claim 3 and the embodiment in dependent Claim 2.

Consequently, the subject-matter of Set D (the Main Request of Appellant I) involves an inventive step.

8. Since the Main Request of Appellant I has been successful, there is no need to further consider its auxiliary requests.
9. *Correction of the priority date*

According to the Minutes of the oral proceedings before the Opposition Division (item 2), the Opposition Division had considered the request for the correction of the priority date as filed by letter dated 14 March 2003 (cf. item I.5 of the decision under appeal) to be allowable, this had not been disputed by the Opponents. In view of the wording of Article 76(1) EPC, the Board sees no reason to deviate therefrom. Consequently, the front page of the patent specification should be corrected accordingly.

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 the Main Request as filed in the oral proceedings, and after any necessary consequential amendment of the description.

The Registrar:

The Chairman:

E. Görgmaier

C. Idez