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D E C I S I O N
of 17 September 2003

Case Number: T 1243/01 - 3.3.3

Application Number: 91906066.5

Publication Number: 0521908

IPC: C08F 4/646

Language of the proceedings: EN

Title of invention:

Catalyst system of enhanced productivity

Applicant:

ExxonMobil Chemical Patents Inc.

Opponents:

THE DOW CHEMICAL COMPANY
Basell Polyolefine GmbH

Headword:

-

Relevant legal provisions:

EPC Art. 54

Keyword:

"Novelty (yes)"

Decisions cited:

G 0002/98

Catchword:

-



Case Number: T 1243/01 - 3.3.3

D E C I S I O N
of the Technical Board of Appeal 3.3.3
of 17 September 2003

Appellant: ExxonMobil Chemical Patents Inc.
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Representative: -

Decision under appeal: Decision of the Opposition Division of the
European Patent Office posted 29 October 2001
revoking European patent No. 0521908 pursuant
to Article 102(1) EPC.

Composition of the Board:

Chairman: R. J. Young
Members: P. Kitzmantel
J. H. Van Moer

Summary of Facts and Submissions

I. Mention of the grant of European patent No. 0 521 908 in respect of European patent application No. 91 906 066.5 in the name of Exxon Chemical Patents Inc. (now ExxonMobil Chemical Patents Inc.), which had been filed on 19 March 1991 as PCT/US91/01860 (WO 91/14713) claiming a US priority of 20 March 1990, was announced on 3 July 1996 on the basis of 14 claims, Claim 1 reading as follows:

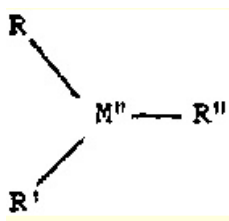
"1. A process for producing ethylene homopolymers or copolymers of ethylene, α -olefins, diolefins, cyclic olefins or acetylenically unsaturated monomers or mixtures thereof, comprising contacting the monomer in a polymerising diluent with:

(a) an ionic pair comprising

(i) a cation of a bis(cyclopentadienyl) Group IV-B metal compound, and

(ii) an activator compound comprising a labile, bulky anion which is a single coordination complex having a plurality of lipophilic radicals covalently coordinated to and shielding a central charge bearing metal or metalloid atom, the bulk of said anion being such that the anion is sterically hindered from covalently coordinating to the Group IV-B metal cation, and the lability of said anion being such that it is displaceable from said Group IV-B metal cation by an unsaturated hydrocarbon having a Lewis base strength equal to or greater than ethylene; and

(b) a hydrolysable Lewis acid of the formula



wherein M'' is a Group III-A element, R, R', and R'' are independently, a straight or branched chain alkyl radical, a cyclic hydrocarbyl radical, an alkyl substituted cyclic hydrocarbyl radical, an aromatic radical or an alkyl substituted radical having from C₁-C₂₀ in carbon number, and R' may also be an alkoxide radical having from C₁-C₂₀ in carbon number,

said Group IV-B metal compound and said activator compound being present in amounts sufficient to provide a catalytically active species; and said Group III-A element compound being present in an amount sufficient to neutralize adventitious impurities."

Claims 2 to 8 were dependent on Claim 1; Claim 9 related to the use of a Group IIIA element compound improving the productivity of an ionic metallocene olefin polymerisation catalyst of a cation of a metallocene of a Group IVB transition metal and of an activator as defined according to Claim 1; Claims 10 to 13 related to a catalyst system as defined according to Claim 1; and Claim 14 related to a polymerisation process continuing the contacting step of Claim 1 for a sufficient period of time to polymerise at least a portion of the monomer thereby forming a polymer product.

II. Notice of Opposition requesting revocation of the patent in its entirety on the grounds of Article 100(a), (b) and (c) EPC was filed by

The Dow Chemical Company (Opponent I) on 2 April 1997 and

BASF AG (later Basell Polyolefine GmbH) (Opponent II) on 3 April 1997 (only Article 100(a) EPC).

The oppositions were *inter alia* based on document

D4: EP-A-0 513 380.

III. By its decision announced orally on 10 October 2001 and issued in writing on 29 October 2001, which was based on amended sets of claims of a main request (not maintained in this appeal) and of a first auxiliary request, the Opposition Division revoked the patent.

(a) Claim 1 of the first auxiliary request read as follows:

"1. A process for producing copolymers of ethylene monomer comprising

(I) contacting the monomer in a polymerising diluent with:

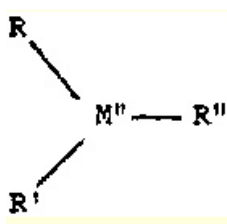
(a) an ionic pair comprising

(i) a cation of a bis(cyclopentadienyl) hafnium compound, and

(ii) a labile, bulky anion of an activator compound, which anion is a single coordination

complex having a plurality of lipophilic radicals covalently coordinated to and shielding a central charge bearing metal or metalloid atom, the bulk of said anion being such that the anion is sterically hindered from covalently coordinating to the hafnium cation, and the lability of said anion being such that it is displaceable from said hafnium cation by an unsaturated hydrocarbon having a Lewis base strength equal to or greater than ethylene; and

(b) a hydrolysable Lewis acid of the formula



wherein M'' is a Group III-A element, R, R', and R'' are independently, a straight or branched chain alkyl radical, a cyclic hydrocarbyl radical, an alkyl substituted cyclic hydrocarbyl radical, an aromatic radical or an alkyl substituted radical having from C₁-C₂₀ in carbon number, and R' may also be an alkoxide radical having from C₁ to C₂₀ in carbon number,

the ionic pair being the reaction product of a bis(cyclopentadienyl)hafnium compound having a proton reactable substituent, and an activator compound comprising a cation having a donatable proton, and said labile, bulky anion,

said hafnium compound and said activator compound being present in amounts sufficient to provide a

catalytically active species; and said Group III-A element compound being present in an amount sufficient to neutralize adventitious impurities,

(II) continuing the contacting step of (I) for a sufficient period of time to polymerize at least a portion of the monomer, and

(III) thereby forming a copolymer product."

The further Claims 2 to 7 of this request were dependent on Claim 1.

- (b) That decision *inter alia* held that, contrary to Article 123(2) EPC, Claim 1 of the main request lacked support in the original application and that Claim 1 of the first auxiliary request was anticipated by the disclosure of D4, a document which was to be considered as relevant prior art under Article 54(3) EPC because, with respect to the definition of the hydrolysable Lewis acid (feature (I)(b) of Claim 1), the subject-matter of this request was not entitled to the claimed priority.

The novelty objection of the Opposition Division was essentially based on the contention that, in view of a teaching in D4 to replace zirconium by hafnium as metal in bis(cyclopentadienyl) metallocene compounds, the disclosure of this document encompassed ethylene copolymerisation processes according to Examples 3 and 6 of this document which used bis(cyclopentadienyl)hafnium

compounds in lieu of the corresponding zirconium compounds actually used in these Examples.

IV. On 27 November 2001 the Patentee (Appellant) lodged an appeal against the decision of the Opposition Division and paid the appeal fee on the same day. The Statement of Grounds of Appeal comprising sets of claims of a main request and of two auxiliary requests (A and B) was received on 28 February 2002.

Apart from the obviously erroneous presence of the word "comprising" after the passage in feature (I)(a)(ii) of Claim 1 "a labile, bulky anion of an activator compound" the claims of the main request are identical to those of the first auxiliary request before the Opposition Division (cf. section III(a) above), those of the two auxiliary requests comprise more restrictive definitions of feature (I)(b) of Claim 1.

V. The arguments of the Appellant which are relevant to this decision, i.e. those relating to the operative main request (i.e. former "first auxiliary request"), may be summarized as follows:

- (a) The decision under appeal did not raise any objections under Article 123 EPC and Article 83 EPC.
- (b) The subject-matter of Claim 1 was entitled to the claimed priority because the term "hydrolysable Lewis acid" as defined in feature (I)(b) of Claim 1, when correctly interpreted in the light of G 2/98 (OJ EPO 2001, 413), was unambiguously disclosed in the priority document. This

conclusion resulted from the following deliberations:

- (i) Several statements in the priority document (page 4, lines 12 to 19; page 5, lines 6 to 8; page 23, lines 16 to 20; page 27, lines 25 to 26; page 29, lines 3 to 8) emphasised that the claimed process required the absence of oxygen and water and that therefore the additive component of the catalyst system should be capable of "neutralising" these impurities, eg by reacting with water.
- (ii) Under the circumstances of the reaction and polymerisation conditions disclosed in the priority document this disclosure could have "no other meaning than reactive towards water by way of hydrolysis" (page 3, second paragraph of Statement of Grounds of Appeal).
- (iii) The compound $B(C_6F_5)_3$ referred to in the decision under appeal was "not reactive with respect to water in a way which would neutralize this impurity" (page 3, third paragraph of the Statement of Grounds of Appeal).
- (iv) In view of the valid priority claim, D4 was "no prior art document at all and thus has to be disregarded for evaluation of patentability of the claimed subject-matter" (page 3, last paragraph of the Statement of Grounds of Appeal).

(c) Moreover, even if the priority claim was held to be invalid - with the consequence that D4 became citable under Article 54(3) EPC - the novelty of the claimed subject-matter was not prejudiced by the disclosure of this document.

(i) Firstly, because several selections from the general disclosure of D4 were required to arrive at the claimed combination of features, i.e. the selection:

- of ethylene as monomer,
- of bis(cyclopentadienyl) compounds as transition metal compounds,
- of hafnium as metal of the transition metal compounds, and
- of a hydrolysable Lewis acid as defined in Claim 1 (page 5, second paragraph of the Statement of Grounds of Appeal).

(ii) Secondly, because the reliance in the decision under appeal on specific examples as starting point for further selections from the general disclosure was inappropriate for the evaluation of novelty (page 5, second to last paragraph of the Statement of Grounds of Appeal).

None of the worked examples of D4, including Examples 3 and 6 which did not mention bis(cyclopentadienyl) hafnium compounds, used all features of the claimed subject-matter (page 5, last paragraph of the Statement of Grounds of Appeal).

VI. Opponent I (Respondent I) stated, in a submission dated 28 June 2002, that it did "not raise any further objections against the Main Request, and the First and Second Auxiliary Request, or any more limited requests". It furthermore submitted that it did not request oral proceedings "under the condition that the claims are not broadened in the Appeal Proceedings".

Opponent II (Respondent II) indicated, in a submission dated 5 July 2002, that it would make no further comment on the Statement of Grounds of Appeal and stated that it did not maintain its request for oral proceedings if the scope of the claims was not extended beyond that of the present main request.

VII. The Appellant requested that the decision under appeal be set aside and that the case be remitted to the first instance for evaluation of inventive step on the basis of the main request, auxiliary request A or auxiliary request B all filed with the Statement of Grounds of Appeal.

Apart from the afore-mentioned submissions, the Respondents refrained from making any specific request.

Reasons for the Decision

1. The appeal is admissible.

Main request

2. *Article 123(2) and (3) EPC*

The Board concurs with the conclusions drawn in paragraphs 3.1 to 3.3 and 4.1 to 4.4 of the decision under appeal; the requirements of Article 123(2) and (3) EPC are thus deemed to be met.

3. *Document D4*

- 3.1 Whether this document is to be considered as prior art relevant under Article 54(3) EPC depends on whether the patent in suit is entitled to the claimed priority.

- 3.2 Conversely, the priority issue does not arise in this case if D4 does not disclose the claimed subject-matter.

- 3.3 It emerges from the following considerations that the latter is indeed the case.

- 3.4 Claim 1 of this document relates to a process for producing an olefin based polymer in which homopolymerisation of an alpha-olefin or copolymerization of two or more of alpha-olefins is carried out in the presence of a catalyst comprising as main components the following compounds (A), (B) and (C):

(A) a transition metal compound;

(B) a compound capable of forming an ionic complex when reacted with a transition metal compound; and
(C) an organoaluminum compound.

Example 3 describes the preparation of an ethylene/propylene copolymer according to the procedures of Examples 1 and 2, using a catalyst system comprising triisobutylaluminium, ferrocenium tetrakis(pentafluorophenyl)borate and ethylenebis(indenyl)dimethyl zirconium.

Similarly, Example 6 discloses the preparation of an ethylene/propylene copolymer with a catalyst system comprising triisobutylaluminium, ferrocenium tetrakis(pentafluorophenyl)borate and bis(cyclopentadienyl)zirconium dimethyl.

On page 3, line 57 to page 4, line 3 it is stated:
"These transition metal compounds [A] include a variety of compounds, particularly include those containing a transition metal belonging to the IVB and VIII Groups of the Periodic Table, more suitably a transition metal of the IVB Group, i.e., titanium (Ti), zirconium (Zr) or hafnium (Hf). More preferred are cyclopentadienyl compounds represented by the following Formula ...".

3.5 The disclosure in D4 which is nearest to the claimed subject-matter is that of Examples 3 and 6 whose catalyst systems differ therefrom only by the use of zirconium in lieu of hafnium as metal atom of the bis(cyclopentadienyl) metallocene compounds (feature (I)(a)(i) of Claim 1). Otherwise these Examples meet the requirements of present Claim 1.

3.6 However, the contention of the Opposition Division that - because of the statement on page 4, line 1 of D4 mentioning zirconium and hafnium as members of one group of suitable transition metals - D4 also comprised disclosures corresponding to Examples 3 and 6 which used bis(cyclopentadienyl) hafnium compounds instead of the zirconium compounds is ill-conceived; this contention does not take account of the fact that present Claim 1 comprises a combination of features and contains no reasoned argument why the skilled reader of D4 would interpret its disclosure as comprising an ethylene copolymerisation process comprising all of these features in combination. In the absence of a clear suggestion for the replacement of one feature of a worked example, albeit one preferred in the general context of the prior art disclosure, while simultaneously maintaining all of its other features, such a replacement would *prima facie* lead to a new combination of features.

3.7 Even if, additionally, one took into account

- that D4 on page 4, lines 1 to 23 *inter alia* disclosed metallocene compounds of eg Formula (II) $Cp_2M^1R^1aR^2b$ wherein Cp is a cyclopentadienyl group and M^1 is Ti, Zr or Hf, thus providing a general teaching for the exchangeability of zirconium and hafnium in bis(cyclopentadienyl) metallocene compounds,
- that the definition of the compounds (B) of D4 (page 7, line 42 to page 9, line 17) satisfied the requirements of the activator compound according to feature (I)(a)(ii) of present Claim 1, and

- that the organoaluminum compounds (C) of D4 were hydrolysable Lewis acids falling within the definition of feature (I)(b) of present Claim 1,
- the novelty of its subject-matter must still be recognised because the disclosure in D4 of a catalyst system combining these three catalyst components (including a bis(cyclopentadienyl) hafnium compound) does not automatically entail its disclosure for producing copolymers of ethylene involving the use of a polymerising diluent, both being features of present Claim 1.

The reason for this conclusion is that the use of such a catalyst system under these conditions would require selections from the disclosure of D4 with regard to the polymer to be prepared and with regard to the polymerisation technique to be chosen, because

- among the monomers suggested in D4 ethylene is just one member of a group of monomers (page 10, lines 32 to 34),
- D4 relates to the preparation of homo- and copolymers (Claim 1), and because
- the polymerisation technique to be used according to D4 comprises methods which do not require the use of a polymerisation diluent (page 10, lines 44 to 46).

3.8 The fact that, apart from the use of a zirconium in lieu of a hafnium metallocene compound, Examples 3

and 6 of D4 realise all features of present Claim 1 cannot invalidate the afore-mentioned conclusion because these accidental combinations fail to have the authority of a general disclosure of a combination of these features which is missing in D4.

- 3.9 The disclosure of document D4 does not therefore comprise the subject-matter of present Claim 1.
- 3.10 The same applies *a fortiori* to the subject-matter of Claims 2 to 7 which are dependent on Claim 1.
4. In this event the issue of whether the patent in suit is entitled to the claimed priority is of no consequence and need not be decided.
5. With regard to the reasons underlying the decision under appeal there is thus no need either to deal with the Appellant's auxiliary requests.
6. Since the objection in the decision under appeal against the present main request (former first auxiliary request) was confined to the issue of novelty and since the Appellant requested that the case be remitted to the first instance for the evaluation of inventive step, the Board, in the application of its power under Article 111(1) EPC, decides to remit the case to the first instance.

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 for further prosecution.

The Registrar:

The Chairman:

E. Görgmaier

R. Young