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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: OLEFIN POLYMERIZATION PROCESSES USING SUPPORTED CATALYSTS

(57) Abstract: Improved Group 8-10 transition metal based supported catalyst processes for the polymerization of olefins are described. Some of the improvements pertain to protocols for catalyst preparation and activation which improve the catalyst productivity in the presence of hydrogen as a molecular weight control agent.



WO 02/036642 A3

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 01/42974

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C08F4/70 C08F10/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 C08F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, CHEM ABS Data, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 98 56832 A (DU PONT ; BENNETT ALISON MARGARET ANNE (US); MCLAIN STEPHEN JAMES () 17 December 1998 (1998-12-17) examples 61,62,66,68,72,73 ---	1,2
X	WO 99 62968 A (EASTMAN CHEM CO) 9 December 1999 (1999-12-09) examples 116,117 page 105, line 13 - line 15 examples 177,189	1,2
Y	claims 1-7 page 32, line 27 - line 35 page 33, line 2 -page 35, line 17 --- -/--	3

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 00 32641 A (SPEAKMAN JOHN GABRIEL ;BERARDI ALAIN (FR); BP CHEMICALS SNC (FR);) 8 June 2000 (2000-06-08) examples 1.1-1.4 page 5, line 27 - line 29 ---	5-8
Y	PATENT ABSTRACTS OF JAPAN vol. 1998, no. 02, 30 January 1998 (1998-01-30) & JP 09 278822 A (MITSUI PETROCHEM IND LTD), 28 October 1997 (1997-10-28) abstract figure 1 ---	5,7
Y	WO 00 50470 A (EASTMAN CHEM CO) 31 August 2000 (2000-08-31) claims 15,16 page 244 examples 350,352 -----	3,6,8

INTERNATIONAL SEARCH REPORT

national application No.
PCT/US 01/42974

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: -
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☒ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
1-4 + 5-8
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-4

Process for the polymerisation of olefins comprising contacting one or more olefins with a catalyst comprising a Group 8-10 transition metal complex of a bidentate N,N-, N,O-, N,P- or P,P-donor ligand, wherein the catalyst is attached to a solid support, wherein the solid support has been treated with a pore-filling agent, either before, during or after the catalyst and the support have been combined.

2. Claims: 5-8

Process for the polymerisation of olefins comprising contacting one or more olefins with a catalyst comprising a Group 8-10 transition metal complex of a bidentate N,N-, N,O-, N,P- or P,P-donor ligand, wherein the catalyst is attached to a solid support, wherein the catalyst is first activated in the absence of hydrogen in a first reactor containing one or more olefins, and then introduced into a second reactor containing hydrogen in which bulk of the polymerisation takes place.

3. Claims: 9,10

Process for the polymerisation of olefins comprising contacting one or more olefins with a catalyst comprising a Group 8-10 transition metal complex of a bidentate N,N-, N,O-, N,P- or P,P-donor ligand, wherein the catalyst is attached to a solid support, wherein the catalyst is first activated in the presence of hydrogen at a partial pressure of ethylene greater than 400 psig.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Present claim 1 relates to a polymerisation process with a catalyst containing a support which has been treated with a "pore-filling agent " which can be an extremely large number of possible compounds (the definition of the pore-filling agents suitable for the present application given on page 2, lines 18-29 does not limit very much the number of possible compounds!).

In fact, the claims contain so many options that a lack of clarity (and/or conciseness) within the meaning of Article 6 PCT arises to such an extent as to render a meaningful search of the claims impossible. Consequently, the search has been carried out for those parts of the application which do appear to be clear (and/or concise), namely for the cases where the pore-filling agent is triethylborane, diethylzinc, trimethylaluminium or triethylaluminium (recited in the examples)

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 01/42974

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