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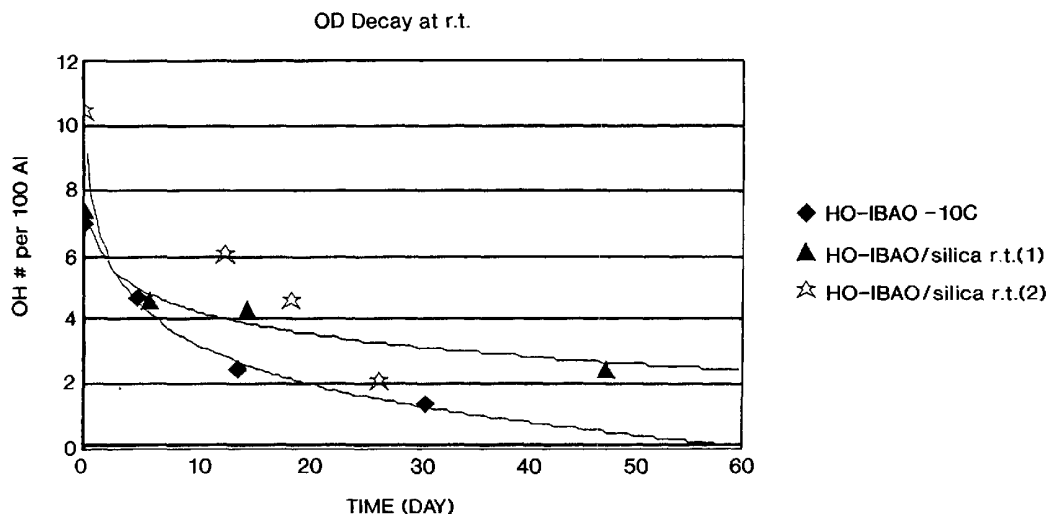
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(54) Title: STABLE CATALYSTS AND CO-CATALYST COMPOSITIONS FORMED FROM HYDROXYALUMINOXANE AND THEIR USE



(57) Abstract: Surprisingly stable olefin polymerization catalysts and co-catalysts formed from hydroxyaluminioxanes are revealed. In one embodiment of the invention, a solid composition of matter is formed from a hydroxyaluminioxane and a treating agent, whereby the rate of OH-decay for the solid composition is reduced as compared to that of the hydroxyaluminioxane. Gelatinous compositions of matter formed from hydroxyaluminioxane and having similar stability characteristics are also disclosed. Processes for converting a hydroxyaluminioxane into a such compositions of matter, supported catalysts formed from such co-catalyst compositions of matter, as well as methods of their use, are described.

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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.

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 01/27449

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 B01J31/22 B01J31/14 C07F17/00 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 B01J C07F 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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 00 24787 A (ALBEMARLE CORP) 4 May 2000 (2000-05-04) the whole document	1-14
A	IKONITSKII I V ET AL: "IR SPECTROSCOPIC STUDY OF THE FORMATION OF A COMPLEX ALKYLALUMINOXANE CATALYST FOR THE POLYMERIZATION OF THE ASPHRE OXIDES OF OLEFINS" ZHURNAL PRIKLADNOI KHIMII, MAIK NAUKA: ROSSIISKAYA AKADEMIYA NAUK, RU, vol. 62, no. 2, 1989, pages 351-354-10638, XP000884249 ISSN: 0044-4618 the whole document	1-14

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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Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 01/27449

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:

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.:

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.:

1-14

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: 1-14

A compound comprising a cation and an anion obtainable by loss of a leaving group from a metal (from d- and fblock) compound to lead to the cation and by loss of a proton from a hydroxyaluminumoxane to lead to the anion. This compound is obtained in (supported) undissolved form and stored in an anhydrous, inert environment.

Process to prepare the aforesaid compound by bringing together the aforesaid metal compound and the hydroxyaluminumoxane, both in solution and recovering the compound in undissolved form.

2. Claims: 15-21

A composition of solids comprising a hydroxyaluminumoxane and a carrier material compatible with said hydroxyaluminumoxane.

~~3. Claims: 22-43~~

A composition comprising a hydroxyaluminumoxane supported on a solid support; the process to prepare the latter; the use of it in the preparation of a supported activated catalyst composition and use of the latter in the polymerisation of olefins.

4. Claims: 44-52

A process for the preparation of a supported aluminumoxane, wherein the hydroxyaluminumoxane is prepared in situ during the claimed process.

5. Claims: 53-61

A process to prepare an activated polymerization catalyst supported by a carrier material by using a supported hydroxyaluminumoxane wherein the hydroxyaluminumoxane is prepared in situ during the claimed process.

6. Claims: 62-69,71-96

A gelatinous composition comprising a hydroxyaluminumoxane, its preparation, its use in the preparation of an activated catalyst composition and use of the latter in the polymerization of olefins

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

7. Claim : 70

A gelatinous composition comprising a hydroxyaluminumoxane⁴ having a specific OH-decay rate.

8. Claims: 97-112

A process to prepare a gelatinous composition starting with an aluminum alkyl compound; its use in the preparation of an activated polymerization catalyst in a gelatinous form as well as in undissolved form.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 01/27449

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0024787 A	04-05-2000	US 6160145 A	12-12-2000
		EP 1124859 A1	22-08-2001
		WO 0024787 A1	04-05-2000
		US 2002086957 A1	04-07-2002
		US 2002072578 A1	13-06-2002