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- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))

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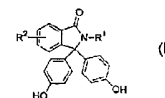
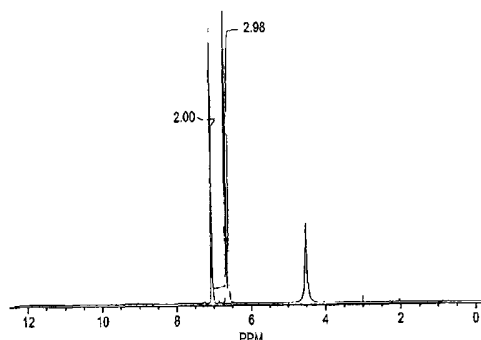
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[Continued on next page]

(54) Title: METHODS FOR PRODUCING AND PURIFYING 2-HYDROCARBYL-3,3-BIS(4-HYDROXYARYL)PHTHALIMIDINE MONOMERS AND POLYCARBONATES DERIVED THEREFROM



(57) Abstract: Disclosed herein is a method for producing a 2-hydrocarbyl-3,3-bis(4-hydroxyaryl)phthalimidine. The method comprises forming a reaction mixture comprising at least one substituted or unsubstituted phenolphthalein compound, at least one substituted or unsubstituted primary hydrocarbyl amine, and an acid catalyst; and heating the reaction mixture to form 2-hydrocarbyl-3,3-bis(4-hydroxyaryl)phthalimidine. An adduct of the 2-hydrocarbyl-3,3-bis(4-hydroxyaryl) phthalimidine is formed either by using an excess of the primary hydrocarbyl amine in the first heating step, or by isolating crude 2-hydrocarbyl-3,3-bis(4-hydroxyaryl)phthalimidine after the heating step and then reacting with a further amount of the primary hydrocarbyl amine. The 2-hydrocarbyl-3,3-bis(4-hydroxyaryl)phthalimidine has a formula (I): where R¹ is selected from the group consisting of a hydrogen and a hydrocarbyl group, and R² is selected from the group consisting of a hydrogen, a hydrocarbyl group, and a halogen.

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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/US2005/022140

A. CLASSIFICATION OF SUBJECT MATTER

C07D209/46

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)

C07D

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, BEILSTEIN Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	LIN M S ET AL: "Polymers with improved flammability characteristics. I. Phenolphthalein-related homopolymers" JOURNAL OF POLYMER SCIENCE. PART A, POLYMER CHEMISTRY, WILEY, NEW YORK, NY, US, vol. 19, 1981, pages 2659-2670, XP009050158 ISSN: 0887-624X cited in the application page 2662, paragraph 5	1-23, 29-32, 39, 40
A	US 4 134 936 A (BYRNE ET AL) 16 January 1979 (1979-01-16) claims 1-11	1-23, 29-32, 39, 40

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

☒ See patent family annex.

* Special categories of cited documents:

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

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"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

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INTERNATIONAL SEARCH REPORT

In: onal application No
PCT/US2005/022140

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 344 910 A (SYBERT ET AL) 6 September 1994 (1994-09-06) cited in the application Examples column 6, line 41 - line 53; claims 1-8	24-28, 33-38
X	US 5 455 310 A (HOOVER ET AL) 3 October 1995 (1995-10-03) Claims, examples	24-28, 33-38
A	WO 02/50185 A (GENERAL ELECTRIC COMPANY) 27 June 2002 (2002-06-27) page 4, paragraph 2 - page 7, paragraph 4	33-38

INTERNATIONAL SEARCH REPORT

onal application No.
PCT/US2005/022140

Box II Observations where certain claims were found unsearchable (Continuation of item 2 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 III Observations where unity of invention is lacking (Continuation of item 3 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.:

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: 1-23, 29-32, 39 and 40

Methods for producing the phthalimidine compound of formula
~~(I) and compounds prepared by said process~~

2. claims: 24-28 and 38

A polymer composition comprising structural units of (I) and
blends with thermoplastic polymers thereof and articles
comprising said polymer composition.

3. claims: 33-37

A method for producing a polycarbonate comprising structural
units of (I)

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2005/022140

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
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US 5344910	A	06-09-1994	EP 0617070 A2 JP 6298924 A	28-09-1994 25-10-1994
US 5455310	A	03-10-1995	CN 1103079 A DE 69415594 D1 DE 69415594 T2 EP 0633292 A1 ES 2126064 T3 JP 7053702 A	31-05-1995 11-02-1999 12-08-1999 11-01-1995 16-03-1999 28-02-1995
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