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(54) Title: MACROMOLECULAR ANTIOXIDANTS BASED ON STERICALLY HINDERED PHENOLIC PHOSPHITES

(57) Abstract: Sterically hindered phenol and phosphite based compounds, represented by a formula selected from (I-III), in and their use as antioxidants in a wide range of materials including, but not limited to, food, plastics, elastomers, composites and petroleum based products is disclosed herein.

International application No PCT/US2006/042235

A. CLASSIFICATION OF SUBJECT MATTER INV. C07F9/141 C07F9/6571 C08K5/00 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) CO7F C08K 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, COMPENDEX, WPI Data C. DOCUMENTS CONSIDERED TO BE RELEVANT Category* Citation of document, with indication, where appropriate, of the relevant passages Relevant to claim No. P,X ISMAIL M N ET AL: "Evaluation of new 1,2,35, thermal stabilizers and antifatigue agents 36,69-71 for rubber vulcanizates" POLYMER PLASTICS TECHNOLOGY AND ENGINEERING, vol. 45, no. 6, July 2006 (2006-07), pages 751-758, XP009081909 ISSN: 0360-2559 table 1; compound 6 -/-χ Further documents are listed in the continuation of Box C. See patent family annex. Special categories of cited documents: *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 "A" document defining the general state of the art which is not considered to be of particular relevance invention "E" earlier document but published on or after the international "X" document of particular relevance; the claimed invention filing date cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "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) "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 "O" document referring to an oral disclosure, use, exhibition or other means in the art. document published prior to the international filing date but later than the priority date claimed "&" document member of the same patent family Date of the actual completion of the international search Date of mailing of the international search report 17 April 2007 27/04/2007 Name and mailing address of the ISA/ Authorized officer European Patent Office, P.B. 5818 Patentiaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Elliott, Adrian Fax: (+31-70) 340-3016

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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.				
Ρ,Χ	JOOSSENS J ET AL: "Diphenyl Phosphonate Inhibitors for the Urokinase-Type Plasminogen Activator: Optimization of the P4 Position" JOURNAL OF MEDICINAL CHEMISTRY, vol. 49, no. 19, 21 September 2006 (2006-09-21), pages 5785-5793, XP002422332 ISSN: 0022-2623 page 5790, column 2, line 12	1,2				
X	GB 1 372 042 A (SANDOZ LTD) 30 October 1974 (1974-10-30)	1-5, 35-39, 69-74				
.,	page 1, line 5 - line 18; example 4					
X	GB 1 320 169 A (ASHLAND OIL INC) 13 June 1973 (1973–06–13) page 5; compound II	1-12, 35-46, 69-74				
	page 2, line 40 - page 3, line 40					
X	BELYAEV A ET AL: "Structure-activity relationship of diaryl phosphonate esters as potent irreversible dipeptidyl peptidase IV inhibitors" JOURNAL OF MEDICINAL CHEMISTRY, vol. 42, no. 6, 25 February 1998 (1998-02-25), pages 1041-1052, XP001205981 ISSN: 0022-2623 page 1042; compounds 9E,9H,9I,9J	1,2				
A	BLOKHIN Y I ET AL: "Phosphorylation of dihydric phenols with amides of phosphorous acid" RUSSIAN CHEMICAL BULLETIN, vol. 45, no. 9, 1996, pages 2250-2251, XP009081979 ISSN: 1066-5285 compound 5	1-12, 35-46, 69-74				
A	PATOPRSTY V ET AL: "13C NMR Study of 3,9-Di(alkylphenoxy)-2,4,8,10-tetraoxa-3,9-diphosphaspiro[5.5]undecanes" MAGNETIC RESONANCE IN CHEMISTRY, vol. 23, no. 2, 1985, pages 122-126, XP007901951 ISSN: 0749-1581 the whole document	1,13-23, 35, 47-57, 69-74				

4

International application No
PCT/US2006/042235

C(Continua	tion). DOCUMENTS CONSIDERED TO BE RELEVANT	
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Α	US 3 655 831 A (FRIEDMAN LESTER) 11 April 1972 (1972-04-11)	1,13-23, 35, 47-57, 69-74
	the whole document	09 74
Α	DATABASE CA [Online] CHEMICAL ABSTRACTS SERVICE, COLUMBUS, OHIO, US; MINAGAWA, MOTONOBU: "Organic phosphate stabilizers for polyamides and polyurethanes" XP002429584 retrieved from STN Database accession no. 81:153647	1,13-23, 35, 47-57, 69-74
	abstract -& JP 49 029339 A (ADEKA ARGUS CHEMICAL CO., LTD.) 15 March 1974 (1974-03-15)	
Α	US 4 855 345 A (ROSENBERGER ET AL) 8 August 1989 (1989-08-08)	1-23, 35-57, 69-74
A	examples 1,5 WO 03/102004 A (CIBA SC HOLDING AG) 11 December 2003 (2003-12-11)	1,13-23, 35, 47-57,
	the whole document	69-74
A	WO 2005/060500 A (DOVER CHEMICAL CORP) 7 July 2005 (2005-07-07)	1,13-23, 35, 47-57, 69-74
	the whole document	
А	US 2004/164279 A1 (STEVENSON ET AL) 26 August 2004 (2004-08-26)	1,13-23, 35, 47-57, 69-74
	the whole document	33 / 4

Information on patent family members

International application No
PCT/US2006/042235

Patent document cited in search report		Publication date		Patent family member(s)		Publication date
GB 1372042	A	30-10-1974	BE CA CH DE ES FR IT JP NL US	773823 989854 547335 2150787 395882 2111320 964507 50035098 7114062 3816568	A1 A1 A1 A5 B B	31-01-1972 25-05-1976 29-03-1974 20-04-1972 16-10-1974 02-06-1972 31-01-1974 13-11-1975 17-04-1972 11-06-1974
GB 1320169	Α	13-06-1973	DE FR JP US	2028878 2046808 50005211 3907939	A5 B	13-05-1971 12-03-1971 01-03-1975 23-09-1975
US 3655831	Α	11-04-1972	BE US	736347 3516963		31-12-1969 23-06-1970
JP 49029339	A	15-03-1974	JP JP	947666 53028944		20-04-1979 17-08-1978
US 4855345	A	08-08-1989	EP JP	0250367 63002996		23-12-1987 07-01-1988
WO 03102004	A	11-12-2003	AT AU CA JP US	330963 2003232815 2486415 2005528447 2005176860	A1 A1 T	15-07-2006 19-12-2003 11-12-2003 22-09-2005 11-08-2005
WO 2005060500	A	07-07-2005	CA CN EP KR MX US	2548088 1890254 1692150 20060111565 PA06006422 2005131244	A A2 A A	07-07-2005 03-01-2007 23-08-2006 27-10-2006 23-08-2006 16-06-2005
US 2004164279	A1	26-08-2004	NON	 [