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#### **Declarations under Rule 4.17:**

- 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))
- of inventorship (Rule 4.17(iv))

#### Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))
- (88) Date of publication of the international search report:

5 November 2009



(54) Title: EPOXIDIZED SOYATE DIESTERS AND METHODS OF USING SAME

(57) Abstract: An unhindered polyol is used to react with an epoxidized soyate to make epoxidized soyate diester in the presence of a catalyst. The unhindered polyol can be 1,3-propanediol or any polyol having four or more carbon atoms with no two adjacent carbon atoms having hydroxyl functionality. Preferably, a combination of catalysts is used to promote the transesterification reaction of the epoxidized soyate with the unhindered polyol to yield a high percentage of epoxidized soyate diester with epoxy functionality retained. The primary catalyst is a metallic hydroxide, and the secondary catalyst is a titanate. Bioderived epoxidized soyate diester plasticizers useful for thermoplastics and thermosets result.

International application No. **PCT/US2009/033043** 

#### A. CLASSIFICATION OF SUBJECT MATTER

C07D 301/14(2006.01)i, C07D 301/03(2006.01)i, C08K 5/15(2006.01)i, C08L 27/06(2006.01)i, C07C 59/06(2006.01)i, C08J 3/18(2006.01)i

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 8 as above

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 practicable, search terms used) eKOMPASS, Google patent, Google

#### C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
X	US 2978463 A (Kuester, F.E. et al) 4 April 1961 See col. 2 lines 4-65, col. 3 lines 15-31, lines 47-64, col.4 line 11-19, example XXIII, claims	1-4, 13-18
A	US 6797753 B2 (Benecke, H.P. et al) 28 September 2004 See abstract, example 1, claims	1-4, 13-18
A	US 5324846 A (Hirshman, J.L. et al) 28 June 1994 See the whole document	1-4, 13-18
A	US 7071343 B2 (Daute, P. et al) 4 July 2006 See the whole document	1-4, 13-18
A	US 6573354 B1 (Petrovic, Z. et al) 3 June 2003 See the whole document	1-4, 13-18

	Further documents are	listed in the	e continuation of Box	хC.
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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
- "E" earlier application or patent 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 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 mailing of the international search report

Date of the actual completion of the international search

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#### INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2009/033043

Box No. II	Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)			
This internat	ional search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:			
1 1	nims Nos.: cause they relate to subject matter not required to be searched by this Authority, namely:			
2 <b>\</b> Ck	ima Naga ( , 9, 11			
bec bec	aims Nos.: 6, 8-11 cause they relate to parts of the international application that do not comply with the prescribed requirements to such an ent that no meaningful international search can be carried out, specifically:			
cl	laims 6, 8, 10 and 11 are singularly dependent claims which refer to multiple dependent claims which are unclear. Also, aim 9 refers to any of "above claims" which are unclear. As a result, these claims are too unclear to make meaningful search ossible.			
	nims Nos.: 5, 7, 9, 12 cause they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).			
Box No. III	Observations where unity of invention is lacking (Continuation of item 3 of first sheet)			
This Interna	tional Searching Authority found multiple inventions in this international application, as follows:			
	all required additional search fees were timely paid by the applicant, this international search report covers all searchable ims.			
	all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment any additional fee.			
	only some of the required additional search fees were timely paid by the applicant, this international search report covers y 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 or	Protest  The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.  The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.  No protest accompanied the payment of additional search fees.			

#### INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

### PCT/US2009/033043

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