



(51) International Patent Classification:

B01D 3/00 (2006.01) *C07C 55/10* (2006.01)
C07C 51/43 (2006.01) *C07C 55/14* (2006.01)
C07C 51/44 (2006.01) *C07C 55/18* (2006.01)
C07C 51/48 (2006.01) *C07C 55/20* (2006.01)
C07C 55/02 (2006.01) *C07C 55/21* (2006.01)

(21) International Application Number:

PCT/US2012/022718

(22) International Filing Date:

26 January 2012 (26.01.2012)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

61/437,589 29 January 2011 (29.01.2011) US

(71) Applicant (for all designated States except US): **EMERY OLEOCHEMICALS LLC** [US/US]; 4900 Este Avenue, Cincinnati, OH 45232 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **WALKER, Thomas, Chad** [US/US]; 1513 Shirepeak Way, Independence, KY 41051 (US). **TURNER, Stephen, Wayne** [US/US]; 6028 Meadow Falls Drive, Hamilton, OH 45011 (US). **LANDWEHR, Jay, William** [US/US]; 1044 Cedar Brook Drive, Villa Hills, KY 41017 (US). **DA SILVA ROSA, Douglas** [BR/US]; 8794 Applesseed Drive, Cincinnati, OH

45249 (US). **DURCHHOLZ, Mark, Elliot** [US/US]; 8127 Fox Knoll Drive, West Chester, OH 45069 (US).

(74) Agents: **CAREY, James, P.** et al.; Wood, Herron & Evans, LLP, 2700 Carew Tower, 441 Vine Street, Cincinnati, OH 45202-2917 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

[Continued on next page]

(54) Title: METHOD OF PURIFYING A DICARBOXYLIC ACID

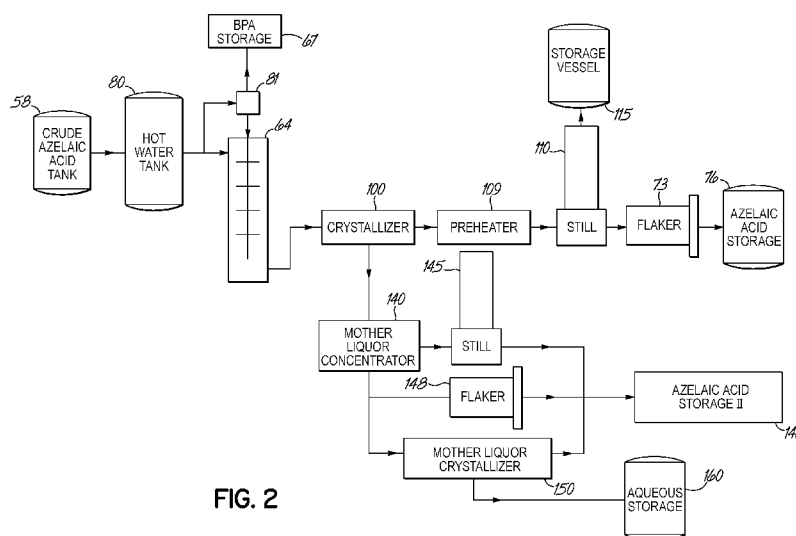


FIG. 2

(57) Abstract: A process for purifying a dicarboxylic acid that is derived from the mixed oxidation products from an ozonization of a mixture containing an ethylenically unsaturated compound having between 6 to 24 carbons, the process includes distilling the mixed oxidation products to provide a first distillate, and a second distillate, where the second distillate includes the dicarboxylic acid and impurity acids, partitioning the second distillate between water and a organic solvent, separating the organic solvent layer from the water layer, lowering the temperature of the water layer to crystallize at least a portion of the dicarboxylic acid, separating the crystallized dicarboxylic acid solid, melting the crystallized dicarboxylic acid, and distilling the liquid dicarboxylic acid to provide a purified dicarboxylic acid.



— *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:

4 October 2012

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2012/022718

A. CLASSIFICATION OF SUBJECT MATTER INV. B01D3/00 C07C51/43 C07C51/44 C07C51/48 C07C55/02 C07C55/10 C07C55/14 C07C55/18 C07C55/20 C07C55/21 ADD. 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) B01D C07C 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) EPO-Internal, WPI Data											
C. DOCUMENTS CONSIDERED TO BE RELEVANT <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Category*</th> <th style="width: 70%;">Citation of document, with indication, where appropriate, of the relevant passages</th> <th style="width: 20%;">Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; vertical-align: top;">X</td> <td style="vertical-align: top;"> US 3 402 108 A (OEHLSCHLAEGER HERMAN F ET AL) 17 September 1968 (1968-09-17) abstract examples I-VIII claims 1-3 * the figure * </td> <td style="text-align: center; vertical-align: top;">1-19</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">X</td> <td style="vertical-align: top;"> CN 101 250 101 A (SICHUAN SIPO CHEMICAL INDUSTRY [CN] SICHUAN SIPO CHEMICAL INDUSTRY CO) 27 August 2008 (2008-08-27) abstract claims 1-5 examples 1-5 ----- -/-- </td> <td style="text-align: center; vertical-align: top;">1-19</td> </tr> </tbody> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	X	US 3 402 108 A (OEHLSCHLAEGER HERMAN F ET AL) 17 September 1968 (1968-09-17) abstract examples I-VIII claims 1-3 * the figure *	1-19	X	CN 101 250 101 A (SICHUAN SIPO CHEMICAL INDUSTRY [CN] SICHUAN SIPO CHEMICAL INDUSTRY CO) 27 August 2008 (2008-08-27) abstract claims 1-5 examples 1-5 ----- -/--	1-19
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.									
X	US 3 402 108 A (OEHLSCHLAEGER HERMAN F ET AL) 17 September 1968 (1968-09-17) abstract examples I-VIII claims 1-3 * the figure *	1-19									
X	CN 101 250 101 A (SICHUAN SIPO CHEMICAL INDUSTRY [CN] SICHUAN SIPO CHEMICAL INDUSTRY CO) 27 August 2008 (2008-08-27) abstract claims 1-5 examples 1-5 ----- -/--	1-19									
☒ 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 "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 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 7 August 2012	Date of mailing of the international search report 14/08/2012										
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Dunet, Guillaume										

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2012/022718

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 00/68346 A1 (HENKEL CORP [US]) 16 November 2000 (2000-11-16)	19
A	abstract pages 4-6 examples 1-3 claims 1-24 -----	1-18
X	US 2 813 113 A (GOEBEL CHARLES G ET AL) 12 November 1957 (1957-11-12) cited in the application	19
A	* the figure * column 8, paragraph 1 claims 1-12 -----	1-18
X	US 2 916 502 A (ALLEN ROBERT R ET AL) 8 December 1959 (1959-12-08)	19
A	examples 1-5 claims 1-6 -----	1-18
X	EP 1 074 540 A1 (FRISCHE GMBH [DE]) 7 February 2001 (2001-02-07)	19
A	abstract examples 1-6 claims 1-14 -----	1-18

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2012/022718

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3402108	A	17-09-1968	NONE
CN 101250101	A	27-08-2008	NONE
WO 0068346	A1	16-11-2000	US 5973173 A 26-10-1999 WO 0068346 A1 16-11-2000
US 2813113	A	12-11-1957	ES 213664 A1 01-07-1954 US 2813113 A 12-11-1957
US 2916502	A	08-12-1959	NONE
EP 1074540	A1	07-02-2001	AT 239690 T 15-05-2003 CA 2314943 A1 05-02-2001 DE 59905469 D1 12-06-2003 EP 1074540 A1 07-02-2001 JP 2001072642 A 21-03-2001 US 6362368 B1 26-03-2002 US 2002068837 A1 06-06-2002