

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
1 September 2011 (01.09.2011)

PCT

(10) International Publication Number
WO 2011/106338 A3

(51) International Patent Classification:
C08B 37/00 (2006.01) *A61K 8/73* (2006.01)

(21) International Application Number:
PCT/US2011/025798

(22) International Filing Date:
23 February 2011 (23.02.2011)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/308,668 26 February 2010 (26.02.2010) US

(71) Applicant (for all designated States except US): **HERCULES INCORPORATED** [US/US]; Hercules Plaza, 1313 North Market Street, Wilmington, DE 19894-0001 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **CHAN, Anita, N.** [US/US]; 709 Ashford Road, Wilmington, DE 19803 (US). **DZIUK, Louis, Patrick, Jr.** [US/US]; 2989 Highway 80, Karnes City, TX 78118 (US). **ERAZO-MAJEWICZ, Paquita** [US/US]; 126 Stoney Ridge Rd., Landenburg, PA 19350 (US). **MODI, Jashawant, J.** [US/US]; 57 Raphael Road, Hockessin, DE 19707 (US). **MICHELSON, M., Olaf** [US/US]; 5739 Cleathill Drive, Loveland, OH 45140 (US).

(74) Agents: **LUNN, Gregory, J.** 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, RO, RS, RU, 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, 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))
- 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:
1 March 2012

(54) Title: POLYSACCHARIDE PRODUCTS WITH IMPROVED PERFORMANCE AND CLARITY IN SURFACTANT BASED AQUEOUS FORMULATIONS AND PROCESS FOR PREPARATION

(57) Abstract: A process for producing anionic, nonionic, amphoteric or cationic derivatized polysaccharide products which demonstrate high clarity in surfactant-based compositions. The polysaccharide polymer is reacted for a sufficient time and at a sufficient temperature in the presence of water, caustic, and at least one surfactant. The polysaccharide polymer may optionally be reacted with an oxidizing agent, hydrolytic or proteolytic enzymes, molecular weight reducing agents and a cationizing agent and nonionic agent. The formed derivatized polysaccharide has a lower clarity in water than in an aqueous surfactant system. The derivatized polysaccharide product can be used in personal care and or household care products.



WO 2011/106338 A3

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2011/025798

A. CLASSIFICATION OF SUBJECT MATTER
INV. C08B37/00 A61K8/73
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)
C08B A61K

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, BIOSIS, EMBASE, MEDLINE, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2003/211952 A1 (ERAZO-MAJEWICZ PAQUITA [US] ET AL) 13 November 2003 (2003-11-13) cited in the application	1-7,16, 19,25-28
Y	the whole document	8-15,17, 18,20-24
X	----- US 5 756 720 A (CHOWDHARY MANJIT SINGH [US]) 26 May 1998 (1998-05-26) cited in the application	1-7,16, 19,25-28
Y	example 1	8-15,17, 18,20-24
X	----- US 6 210 689 B1 (MARTINO GARY T [US] ET AL) 3 April 2001 (2001-04-03) cited in the application	1-7,16, 19,25-28
Y	column 3 - column 4	8-15,17, 18,20-24
	----- -/-	



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 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

3 January 2012

Date of mailing of the international search report

11/01/2012

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

Friedrich, Christof

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2011/025798

Box No. 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 No. 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 fees, this Authority did not invite payment of additional fees.
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 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

International application No

PCT/US2011/025798

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 2008/263788 A1 (HARRISON IAN [FR] ET AL) 30 October 2008 (2008-10-30)	1-7,16, 19,25-28
Y	paragraph [0008] - paragraph [0044]	8-15,17, 18,20-24
X	----- US 3 644 332 A (MOOTH ROBERT A ET AL) 22 February 1972 (1972-02-22)	8
Y	examples 1,2,7	9-15,17, 18,20-24
Y	----- US 4 320 226 A (TIEFENTHALER KARL H O ET AL) 16 March 1982 (1982-03-16)	9-15,17, 18,20-24
Y	examples 1-4	
Y	----- US 4 645 833 A (BAYERLEIN FRIEDRICH [DE] ET AL) 24 February 1987 (1987-02-24)	9-15,17, 18,20-24
Y	examples 1-8	
Y	----- US 5 489 674 A (YEH MICHAEL H [US]) 6 February 1996 (1996-02-06)	9-15,17, 18,20-24
X	----- US 4 129 722 A (IOVINE CARMINE P ET AL) 12 December 1978 (1978-12-12)	8
Y	cited in the application examples 1-3	9-15,17, 18,20-24
Y	----- Mazhar Pasha ET AL: "DERIVATIZATION OF GUAR TO SODIUM CARBOXY METHYL HYDROXY PROPYL DERIVATIVE; CHARACTERIZATION AND EVALUATION", Pak. J. Pharm. Sci., 1 January 2008 (2008-01-01), pages 40-44, XP55015551, Retrieved from the Internet: URL: http://www.pjps.pk/CD-PJPS-21-1-08/Paper-9.pdf [retrieved on 2012-01-02] the whole document	9-15,17, 18,20-24

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2011/025798

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2003211952	A1	13-11-2003	AU 2003223581 A1 11-11-2003 BR 0309939 A 09-02-2005 CA 2484205 A1 20-11-2003 CN 1665843 A 07-09-2005 DE 60314130 T2 17-01-2008 EP 1501873 A1 02-02-2005 ES 2285114 T3 16-11-2007 JP 4619114 B2 26-01-2011 JP 2006501318 A 12-01-2006 MX PA04010690 A 17-02-2005 RU 2319711 C2 20-03-2008 US 2003211952 A1 13-11-2003 WO 03095497 A1 20-11-2003
US 5756720	A	26-05-1998	NONE
US 6210689	B1	03-04-2001	AU 739160 B2 04-10-2001 AU 2122699 A 07-10-1999 AU 2122899 A 30-09-1999 CA 2266167 A1 18-09-1999 CN 1233464 A 03-11-1999 EP 0950393 A2 20-10-1999 JP 11322550 A 24-11-1999 US 6210689 B1 03-04-2001
US 2008263788	A1	30-10-2008	AT 382672 T 15-01-2008 AU 1065502 A 29-04-2002 BR 0114624 A 23-12-2003 CA 2426695 A1 25-04-2002 DE 60132225 T2 18-12-2008 EP 1326952 A1 16-07-2003 FR 2815355 A1 19-04-2002 JP 2004511681 A 15-04-2004 US 2004107505 A1 10-06-2004 US 2007191254 A1 16-08-2007 US 2008263788 A1 30-10-2008 US 2011028376 A1 03-02-2011 WO 0233034 A1 25-04-2002
US 3644332	A	22-02-1972	NONE
US 4320226	A	16-03-1982	BR 8007896 A 16-06-1981 CA 1136619 A1 30-11-1982 CH 642669 A5 30-04-1984 DE 3069084 D1 04-10-1984 DK 512880 A 04-06-1981 EP 0030443 A1 17-06-1981 JP 1003201 B 20-01-1989 JP 1524864 C 12-10-1989 JP 56086901 A 15-07-1981 NO 803637 A 04-06-1981 US 4320226 A 16-03-1982
US 4645833	A	24-02-1987	US 4645833 A 24-02-1987 US 4745184 A 17-05-1988
US 5489674	A	06-02-1996	US 5489674 A 06-02-1996 ZA 9504730 A 08-01-1997

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2011/025798

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4129722	A	12-12-1978	BE 870956 A1 01-02-1979
			CA 1084048 A1 19-08-1980
			DE 2840011 A1 21-06-1979
			FR 2411847 A1 13-07-1979
			GB 2010297 A 27-06-1979
			JP 1344069 C 29-10-1986
			JP 54083983 A 04-07-1979
			JP 60019761 B 17-05-1985
			NL 7809944 A 19-06-1979
			US 4129722 A 12-12-1978

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-4

Polysaccharide polymer such as polygalactomannan

2. claims: 5-7, 16, 27

Polygalactomannan derivatives

3. claims: 8-15, 17-26, 28

Methods for the modification of polysaccharides by reaction with caustic, water, surfactant, and a derivatizing agent
