

**PATENT COOPERATION TREATY**

**PCT**

**INTERNATIONAL SEARCH REPORT**

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference CM4583M-DW	<b>FOR FURTHER ACTION</b> see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/US2017/054816	International filing date ( <i>day/month/year</i> ) 3 October 2017 (03-10-2017)	(Earliest) Priority Date ( <i>day/month/year</i> ) 3 October 2016 (03-10-2016)
Applicant  THE PROCTER & GAMBLE COMPANY		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 6 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

**1. Basis of the report**

a. With regard to the **language**, the international search was carried out on the basis of:

- the international application in the language in which it was filed  
 a translation of the international application into \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b.  This international search report has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43.6*bis*(a)).

c.  With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2.  **Certain claims were found unsearchable** (See Box No. II)

3.  **Unity of invention is lacking** (see Box No III)

4. With regard to the **title**,

- the text is approved as submitted by the applicant  
 the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

- the text is approved as submitted by the applicant  
 the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,

- a. the figure of the **drawings** to be published with the abstract is Figure No. \_\_\_\_\_  
 as suggested by the applicant  
 as selected by this Authority, because the applicant failed to suggest a figure  
 as selected by this Authority, because this figure better characterizes the invention
- b.  none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2017/054816

A. CLASSIFICATION OF SUBJECT MATTER  
INV. C11D1/02 C11D3/20 C11D17/06 C11D3/386  
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)  
C11D

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

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 00/18856 A1 (PROCTER & GAMBLE [US]; TATSUNO TERUAKI [JP]; HARTSHORN RICHARD TIMOTHY) 6 April 2000 (2000-04-06) page 1, paragraph 1 page 2, paragraph 3 page 3, paragraph 6 - page 4, paragraph 1 page 12, paragraph 1 page 13, paragraph 10 page 14, last paragraph - page 21, paragraph 4 page 24, last paragraph - page 25, paragraph 1 page 30, last paragraph - page 46; example 1 page 45, lines 20-21 page 44, lines 1-17 ----- -/--	1-21

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

5 December 2017

Date of mailing of the international search report

13/12/2017

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

Marttin, Emmeline

## INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2017/054816

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>WO 03/038028 A2 (HENKEL KGAA [DE]; GLUESEN BIRGIT [DE]; LIPHARD MARIA [DE]; KRAUS INGRI) 8 May 2003 (2003-05-08)  page 7, paragraph 1 - pages 10-11; claims 1,3-10,12-20; example 1; table 1  page 1, paragraph 2 - page 2, paragraph 3  pages 8-9 - page 21, paragraph 1  page 8, paragraph 2 - page 9, paragraph 2  page 9, paragraph 3  page 11, paragraph 3  page 12, paragraph 2 - page 13, paragraph 3  page 14, paragraph 3  page 32, paragraph 2 - page 33, paragraphs 1,3  page 23, paragraph 4 - page 30, paragraph 3  page 16, paragraph 1-2 - page 18, paragraph 2  page 19, paragraph 3  page 21, paragraph 3  page 27, paragraph 5 - page 28, paragraph 3</p>	1-21
Y	<p>-----  WO 95/12658 A1 (PROCTER &amp; GAMBLE [US]; MACBEATH FIONA SUSAN [GB])  11 May 1995 (1995-05-11)  page 7, line 21  page 1, paragraph 1; example 1  page 30, line 12 - page 31, paragraph 2;  claims 1,6-9  page 20, paragraph 1-3</p>	5,12,14
Y	<p>-----  WO 91/17232 A1 (PROCTER &amp; GAMBLE [US])  14 November 1991 (1991-11-14)  page 7, line 12</p>	16
Y	<p>-----  WO 2015/169851 A1 (BASF SE [DE]; HENKEL AG &amp; CO KGAA [DE])  12 November 2015 (2015-11-12)  page 1, paragraph 1; examples</p>	17
Y	<p>-----  WO 2013/036662 A1 (SUN PRODUCTS CORP [US]; VANBLARCOM DAVID [US]; SHEVADE MAKARAND S [US]) 14 March 2013 (2013-03-14)  paragraphs [0160] - [0161]</p>	18,20
Y	<p>-----  WO 2007/144857 A1 (PROCTER &amp; GAMBLE [US]; LANT NEIL JOSEPH [GB]; PATTERSON STEVEN GEORGE) 21 December 2007 (2007-12-21)  page 21, paragraph 4</p> <p>-----  -/--</p>	8

## INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2017/054816

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 2 363 455 A1 (PROCTER & GAMBLE [US]) 7 September 2011 (2011-09-07) paragraphs [0001] - [0008], [0013] - [0016], [0019] - [0026]; examples; sequence 1  -----	1-21
Y	EP 2 380 957 A1 (PROCTER & GAMBLE [US]) 26 October 2011 (2011-10-26) paragraphs [0001] - [0010], [0013] - [0023], [0059] - [0060]; claims; example 2  -----	1-21

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2017/054816

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0018856	A1	06-04-2000	AT 286960 T 15-01-2005
			AU 6257099 A 17-04-2000
			BR 9914050 A 12-06-2001
			CA 2344997 A1 06-04-2000
			CN 1328597 A 26-12-2001
			DE 69923196 D1 17-02-2005
			DE 69923196 T2 29-12-2005
			EP 1115819 A1 18-07-2001
			ES 2237161 T3 16-07-2005
			IN 243977 B 19-11-2010
			JP 2002525417 A 13-08-2002
			US 6635610 B1 21-10-2003
			WO 0018856 A1 06-04-2000
WO 03038028	A2	08-05-2003	AT 368726 T 15-08-2007
			DE 10153551 A1 22-05-2003
			EP 1440141 A2 28-07-2004
			ES 2289163 T3 01-02-2008
			WO 03038028 A2 08-05-2003
WO 9512658	A1	11-05-1995	AU 8125494 A 23-05-1995
			EP 0651053 A1 03-05-1995
			WO 9512658 A1 11-05-1995
WO 9117232	A1	14-11-1991	AR 244332 A1 29-10-1993
			AT 141639 T 15-09-1996
			AU 7856791 A 27-11-1991
			CA 2081324 A1 09-11-1991
			CN 1057292 A 25-12-1991
			DE 69121460 D1 26-09-1996
			EP 0456315 A2 13-11-1991
			ES 2090229 T3 16-10-1996
			JP H05507744 A 04-11-1993
			MX 172329 B 13-12-1993
			TW 200525 B 21-02-1993
			WO 9117232 A1 14-11-1991
WO 2015169851	A1	12-11-2015	EP 3140382 A1 15-03-2017
			KR 20170003922 A 10-01-2017
			US 2017175048 A1 22-06-2017
			WO 2015169851 A1 12-11-2015
WO 2013036662	A1	14-03-2013	CA 2847546 A1 14-03-2013
			CN 103946360 A 23-07-2014
			EP 2751248 A1 09-07-2014
			JP 2014529693 A 13-11-2014
			KR 20140068141 A 05-06-2014
			US 2013095717 A1 18-04-2013
			US 2016160156 A1 09-06-2016
			US 2016160157 A1 09-06-2016
			WO 2013036662 A1 14-03-2013
WO 2007144857	A1	21-12-2007	AR 061494 A1 03-09-2008
			CA 2652776 A1 21-12-2007
			EP 1867707 A1 19-12-2007
			JP 5882561 B2 09-03-2016
			JP 2009540044 A 19-11-2009
			JP 2015157953 A 03-09-2015

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2017/054816

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
		MX 298662 B	27-04-2012
		RU 2008145092 A	27-07-2010
		US 2010022431 A1	28-01-2010
		WO 2007144857 A1	21-12-2007
-----			
EP 2363455	A1 07-09-2011	BR 112012021632 A2	14-02-2017
		CN 102782110 A	14-11-2012
		CN 102803458 A	28-11-2012
		EP 2363455 A1	07-09-2011
		EP 2365055 A1	14-09-2011
		EP 2365056 A1	14-09-2011
		US 2011212872 A1	01-09-2011
		US 2011212873 A1	01-09-2011
		US 2011212874 A1	01-09-2011
		WO 2011109314 A1	09-09-2011
		WO 2011109354 A1	09-09-2011
		WO 2011109366 A1	09-09-2011
-----			
EP 2380957	A1 26-10-2011	CN 102858935 A	02-01-2013
		EP 2380957 A1	26-10-2011
		US 2011257064 A1	20-10-2011
		WO 2011133285 A1	27-10-2011
-----			