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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**
(PCT Rule 43*bis*.1)

To:

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Date of mailing
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Applicant's or agent's file reference
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FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/US2017/054816

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03.10.2016

International Patent Classification (IPC) or both national classification and IPC
INV. C11D1/02 C11D3/20 C11D17/06 C11D3/386

Applicant
THE PROCTER & GAMBLE COMPANY

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

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Date of completion of this opinion

see form
PCT/ISA/210

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Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established 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)).
2. This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
 - a. forming part of the international application as filed:
 - in the form of an Annex C/ST.25 text file.
 - on paper or in the form of an image file.
 - b. furnished together with the international application under PCT Rule 13ter.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
 - c. furnished subsequent to the international filing date for the purposes of international search only:
 - in the form of an Annex C/ST.25 text file (Rule 13ter.1(a)).
 - on paper or in the form of an image file (Rule 13ter.1(b) and Administrative Instructions, Section 713).
4. In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>1-21</u>
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-21</u>
Industrial applicability (IA)	Yes: Claims	<u>1-21</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Reference is made to the following documents; the numbering will be adhered to in the rest of the procedure.

- D1 WO 00/18856 A1 (PROCTER & GAMBLE [US]; TATSUNO TERUAKI [JP]; HARTSHORN RICHARD TIMOTHY) 6 April 2000 (2000-04-06)
- D2 WO 03/038028 A2 (HENKEL KGAA [DE]; GLUESEN BIRGIT [DE]; LIPHARD MARIA [DE]; KRAUS INGRI) 8 May 2003 (2003-05-08)
- D3 WO 95/12658 A1 (PROCTER & GAMBLE [US]; MACBEATH FIONA SUSAN [GB]) 11 May 1995 (1995-05-11)
- D4 WO 91/17232 A1 (PROCTER & GAMBLE [US]) 14 November 1991 (1991-11-14)
- D5 WO 2015/169851 A1 (BASF SE [DE]; HENKEL AG & CO KGAA [DE]) 12 November 2015 (2015-11-12)
- D6 WO 2013/036662 A1 (SUN PRODUCTS CORP [US]; VANBLARCOM DAVID [US]; SHEVADE MAKARAND S [US]) 14 March 2013 (2013-03-14)
- D7 WO 2007/144857 A1 (PROCTER & GAMBLE [US]; LANT NEIL JOSEPH [GB]; PATTERSON STEVEN GEORGE) 21 December 2007 (2007-12-21)
- D8 EP 2 363 455 A1 (PROCTER & GAMBLE [US]) 7 September 2011 (2011-09-07)
- D9 EP 2 380 957 A1 (PROCTER & GAMBLE [US]) 26 October 2011 (2011-10-26)

2 Subject of the application

The application relates to a low pH solid free flowing particulate laundry detergent comprising organic acid and anionic surfactant, wherein a major amount of the particulate is in the form of a "base particle"; thus the total

detergent comprises further, chemically different particulate components. Such further components beside the base particle may be represented by the organic acid, added in solid particulate form, with or without further added ingredients, and/or further ingredients may be added in separate particulate form, e.g. as co-surfactant particles (or enzyme-, perfume particles, etc). Good cleaning performance is ensured by formulating the solid detergent powder at a lower pH and then to balance the formulation so as to provide good cleaning performance. Due to the low pH, the detergent has good fabric care performance.

3 Inventive step

3.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1-21 does not involve an inventive step in the sense of Article 33(3) PCT.

3.2 The document D1 is considered to represent the most relevant state of the art for the subject-matter of claim 1, and discloses (see (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 25, paragraph 3-5; page 30, last paragraph - page 46; example 1): a solid free flowing particulate laundry detergent comprising at least two particulate components, which comprise at least two detergent active ingredients, that can be defined as pre-formed particulate components, i.e. base detergent particles (page 3, line 20 - page 4, line 2). Composition E of example 1 comprises: (a) anionic deterative surfactant; (b) 1 wt% zeolite builder; (c) 0 wt% phosphate builder; (d) 5 wt% sodium carbonate; (e) 2 wt% sodium silicate; (f) 5 wt% citric acid; and a photobleach. The composition comprises 30 wt% base detergent particles (i.e. 29.5 wt% blown powder, which is rounded off to 30 wt%) comprising: (a) 10 wt% LAS (sodium linear alkyl benzene sulfonate see page 42, line 5); anionic deterative (b) 1 wt% zeolite builder; (c) 0 wt% phosphate builder; (d) 5 wt% sodium carbonate; (e) 2 wt% sodium silicate; and (g) 0.5 wt% cellulase, amylase, protease, lipase). The amylase is Termamyl 120 T or amylolytic enzyme II (see page 36, lines 15-19 and page 44, lines 1-16). The blown powder is obtained from a spray-drying process (see page 3, lines 27-30).

The equilibrium pH of this composition at 1 wt% dilution in deionized water at 20°C is not explicitly disclosed. However, it is implicit that in carrying out the teaching of D1, the skilled person would inevitably arrive at an equilibrium pH in the range of from 6.5 to 9.0 even though this parameter is not explicitly

mentioned. Since the known and the claimed products are identical in all other respects (which is to be expected since the starting products, in particular the amounts of citric acid and sodium carbonate and manufacturing processes are identical) an objection of lack of novelty arises. The burden of proof for an alleged distinguishing feature lies with the applicant. No benefit of doubt can be accorded in the absence of such evidence (see EPO-PCT G-VI. 6). The same applies to the reserve alkalinity of claim 6.

The subject-matter of D1 differs from claim 1 in that another amylase is disclosed, not a variant of the wild-type amylase from *Bacillus* sp. which has at least 90% identity for amino acid sequence SEQ ID NO:6, and which comprises one or more mutations at positions 9, 26, 30, 33, 82, 37, 106, 118, 128, 133, 149, 150, 160, 178, 182, 186, 193, 195, 202, 214, 231, 256, 257, 258, 269, 270, 272, 283, 295, 296, 298, 299, 303, 304, 305, 311, 314, 315, 318, 319, 320, 323, 339, 345, 361, 378, 383, 419, 421, 437, 441, 444, 445, 446, 447, 450, 458, 461, 471, 482 and/or 484, preferably that also contain the deletions of D183* and G184. Claims 1-21 therefore appear to be new over D1 (Article 33(2) PCT).

- 3.2.1 No effect of this difference is demonstrated in the application. It is noted that the application contains comparative examples which show that the low pH detergent powder according to the invention has 66.4% stain removal, compared to a stain removal of 26-27% without amylase. A small difference of 3.36% between stain removal with amylase at pH 7 (according to the invention) and with amylase at pH 10 (not according to the invention) is also shown in the table on page 36 (cf. 64.40% vs 61.06%). However, these comparative examples do not show any effects of replacing the amylases of D1 with another according to claim 1 (which is the distinguishing feature vis-à-vis D1), since there are no comparative examples that compare the amylases of D1 with the claimed amylase. In addition, the effects shown are also not demonstrated to exist over the whole scope of the claim, in particular since the amylase 1 is not further defined in the application. Thus, the objective problem of the present invention is the provision of an alternative low pH solid free flowing particulate laundry detergent.
- 3.2.2 The solution proposed in claim 1 of the present application cannot be considered to involve an inventive step (Article 33(3) PCT), because granular detergent compositions comprising an amylase according to feature (g) of claim 1 are known from document D8. This document discloses a solid free flowing particulate laundry detergent composition comprising anionic

detergative surfactant, (b) from 0-4 wt% zeolite and phosphate builder; (d) from 15-30 wt% sodium carbonate; (e) from 0-10 wt% sodium silicate; (f) from 0-3 wt% citric acid, and an amylase having greater than 90%, or greater than 95% identity to the AA560 alpha amylase endogenous to *Bacillus* sp. DSM 12649 (shown as SEQ ID NO:1). Preferably, the amylase is a variant of the AA560 alpha amylase endogenous to *Bacillus* sp. Typically, the amylase comprises: (i) mutations at one or more, preferably three or more, or five or more, or seven or more, or ten or more, or even all of positions 9, 149, 182, 186, 202, 257, 295, 299, 323, 339 and 345; and (ii) mutations at four or more, preferably all, of positions 118, 183, 184, 195, 320 and 458. Highly preferably, the amylase comprises all of the mutations: R118K, D183*, G184*, N195F, R320K and R458K. It would thus be an obvious matter for the person skilled in the art to replace the amylase of D1 with the amylase of D8 in order to provide an alternative composition.

- 3.3 The document D2 can also be considered to represent the most relevant state of the art for the subject-matter of claim 1. Document D2 discloses low pH solid free flowing particulate laundry detergent comprising organic acid and anionic surfactant, wherein a major amount of the particulate is in the form of a "base particle", to which other particulate components may be added (see e.g. page 21, par. 5). This is also illustrated in Examples E and V in Table 1, page 40. Amylases can also be added to the compositions of D2 (see paragraph bridging pages 24 and 25)

In Example E the amount of sodium carbonate (soda) is above 8wt% (14.7 wt %), and the pH is 7.9-8.0. In example V, the amount of zeolite is above 8% (16 wt%), the amount of organic acid in the particle is 5.5% (3.0 wt% fatty acid and 2.5% citric acid), and the pH is 8.5.

- 3.3.1 The subject-matter of formulation E of D2 differs from claim 1 in that the amount of sodium carbonate is 14.7 wt%, in stead of 8 wt%, and in that the composition does not contain an amylase according to claim 1.

The subject-matter of formulation V of D2 differs from claim 1 in that the amount of zeolite is 16 wt%, in stead of 8 wt%, and in that the composition does not contain an amylase according to claim 1.

Claims 1-21 therefore appear to be new over D2 (Article 33(2) PCT).

No effects of these differences have been demonstrated in the application. Thus, the objective problem of the present invention is the provision of an alternative low pH solid free flowing particulate laundry detergent (see also

point 3.2.1 above).

- 3.3.2 The solution proposed in claim 1 of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) for the following reasons: it lies within the normal practice of the person skilled in the art to adjust the amount of carbonate or zeolite in formulations E and V of D2. Granular detergent compositions comprising an amylase according to feature (g) of claim 1 are known from document D8. This document discloses a solid free flowing particulate laundry detergent composition comprising anionic deterative surfactant, (b) from 0-4 wt% zeolite and phosphate builder; (d) from 15-30 wt% sodium carbonate; (e) from 0-10 wt% sodium silicate; (f) from 0-3 wt% citric acid, and an amylase having greater than 90%, or greater than 95% identity to the AA560 alpha amylase endogenous to *Bacillus* sp. DSM 12649 (shown as SEQ ID NO:1). It would thus be an obvious matter for the person skilled in the art to add the amylase of D8 to the compositions E and V of D2 in order to provide an alternative composition, especially since D2 itself already suggests to add an amylase. The advantages (if any) of adding such compounds to the composition of D2 can also be readily recognized by the person skilled in the art.
- 3.4 The document D9 can also be considered to represent the most relevant state of the art for the subject-matter of claim 1. Document D9 discloses (paragraphs [0001] - [0010], [0013] - [0023], [0059] - [0060]; claims; example 2) solid free flowing particulate laundry detergent compositions B and C comprising anionic deterative surfactant, 10 wt% sodium carbonate, 5 wt% sodium silicate; 10 wt% organic acid (citric acid/palmitic acid), and 1.2% enzymes, having a pH after 20 min (i.e. equilibrium pH) contact with water of less than 9 (preferable from 7-8.5). Preferably the composition contains an amylase with greater than 60% identity to the AA560 alpha amylase endogenous to *Bacillus* sp. DSM 12649, preferably a variant of the AA560 alpha amylase endogenous to *Bacillus* sp. DSM 12649 having: (a) mutations at one or more of positions 9, 26, 149, 182, 186, 202, 257, 295, 299, 323, 339 and 345; and (b) optionally with one or more, preferably all of the substitutions and/or deletions in the following positions: 118, 183, 184, 195, 320 and 458, which if present preferably comprise D183* or G184*.
- 3.4.1 The subject-matter of compositions B and C differs from claim 1 in that the amount of sodium carbonate is 10 wt%, in stead of 8 wt%, and in that the composition does not contain an amylase according to claim 1.
- 3.4.2 The solution proposed in claim 1 of the present application cannot be

considered as involving an inventive step (Article 33(3) PCT) over D9 in combination with document D8, for the same reasons as given above in points 3.3.1 and 3.3.2).

- 3.5 Dependent claims 2-21 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PTC with respect to inventive step.

The reasons therefor are that in the absence of any surprising or new technical effect, the additional features of the said claims are a mere aggregation or juxtaposition of features (EPC-PCT G, G-VII, 7). The additional features are either disclosed in documents D1 or D2 themselves (i.e. the subject-matter of claims 2-4, 6, 7, 9, 13 and 15), or are obvious based on the common general knowledge of the person skilled in the art (e.g. the subject-matter of claim 9), or are combinations of features that are obvious to the man skilled in the art in consideration of the disclosure of the prior art in the following table in combination with D1 or D2 as the closest prior art:

Claim	Prior art reference(s)
5	Co-surfactant particles : D3
8	Combination of lipase enzyme and soil release polymer (D7, p. 21, penultimate paragraph)
10	Polymers (polycarboxylates, polyesters etc) : D2, p.12-13
11	Free of pre-formed per-acid : D2
12	Bleach and bleach activator : D3; D2
14	EDDS, MGDA : D3
16	Tiron : D4, p.7
17	Acyl hydrazone bleach catalyst : D5 (particles of-)

18	Hueing agent : D6, paragraphs 160-161.
19	Enzyme : D2
20	Perfume ester : D4, p.17 (admixed particles); D6
21	Polyvinyl N oxide polymer : D2, p.33

- 4 The subject-matter of claims 1-21 meets the criteria for industrial applicability according to Article 33(4) PCT.

Re Item VII

Certain defects in the international application

- 1 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in D1, D2 and D9 is not mentioned in the description, nor are these documents identified therein.
- 2 The description is not in conformity with the claims as required by Rule 5.1(a)(iii) PCT. The subject-matter described on page 23, lines 28-34 does not fall within the scope of the claims.