

(43) International Publication Date
14 May 2009 (14.05.2009)

PCT

(10) International Publication Number
WO 2009/061379 A3

(51) International Patent Classification:

C11D 3/386 (2006.01) C12N 15/75 (2006.01)
C12N 9/28 (2006.01)

(21) International Application Number:

PCT/US2008/012411

(22) International Filing Date:

3 November 2008 (03.11.2008)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

60/985,619	5 November 2007 (05.11.2007)	US
61/026,579	6 February 2008 (06.02.2008)	US
61/041,075	31 March 2008 (31.03.2008)	US
61/059,411	6 June 2008 (06.06.2008)	US

(71) Applicant (for all designated States except US): **DANISCO US INC., GENENCOR DIVISION** [US/US]; 925 Page Mill Road, Palo Alto, California 94304 (US).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **YOON, Mee-Young** [US/US]; c/o Danisco US Inc., Genecor Division, 925 Page Mill Road, Palo Alto, California 94304 (US).(74) Agents: **BACSI, Steven G.** et al.; Danisco US Inc., Genecor Division, 925 Page Mill Road, Palo Alto, California 94304 (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, 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, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, 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, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, NO, PL, PT, RO, SE, SI, SK, 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))
- with sequence listing part of description (Rule 5.2(a))

[Continued on next page]

(54) Title: ALPHA-AMYLASE VARIANTS WITH ALTERED PROPERTIES

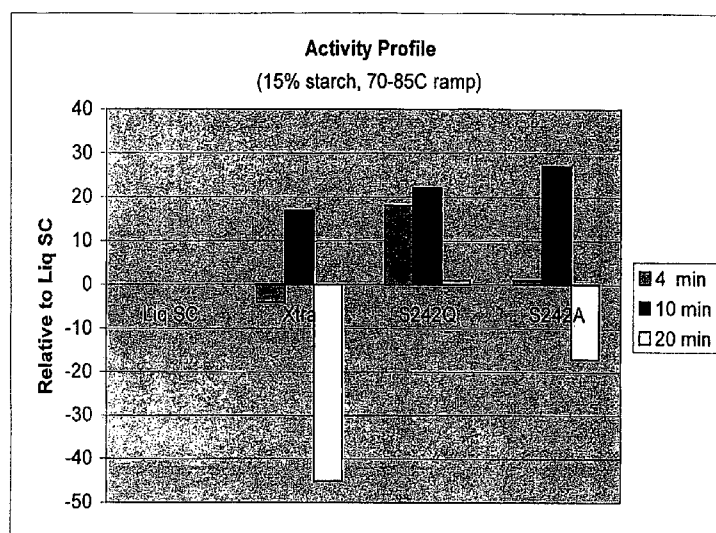


Figure 7

(57) Abstract: Disclosed are compositions comprising variants of alpha-amylase that have alpha-amylase activity and that exhibit altered properties relative to a parent AmyS-like alpha-amylase from which they are derived. The compositions generally comprise at least one of an additional enzyme, a detergent, a surfactant, a chelator, an oxidizing agent, an acidulant, an alkalizing agent, a source of peroxide, a source of hardness, a salt, a detergent complexing agent, a polymer, a stabilizing agent, or a fabric conditioner. Also disclosed are detergent formulations comprising the variants. Methods of using the compositions for desizing woven material and washing or cleaning items, such as dishes or laundry, are disclosed. Kits related thereto are also provided.



(88) Date of publication of the international search report:
27 August 2009

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2008/012411

A. CLASSIFICATION OF SUBJECT MATTER

INV. C11D3/386 C12N9/28 C12N15/75

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)
C12N

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, CHEM ABS Data, EMBL, WPI Data, FSTA

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 02/10355 A (NOVOZYMES AS [DK]) 7 February 2002 (2002-02-07) page 33, line 15 - line 30; claims 1,2,4 -----	1-6, 15-17, 19, 21-23, 26-29, 36,37

☐ 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

4 March 2009

Date of mailing of the international search report

07/07/2009

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

Turri, Matteo

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2008/012411

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 allsearchable 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.:

see additional sheet(s)

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

Invention 1: claim 1-6 (partially), 15-17, 19, 21-23, 26-29, 36, 37

A composition comprising:

- a) at least one variant alpha-amylase comprising an amino acid sequence at least 95% identical to that of a parent AmyS-like alpha-amylase, and having a substitution at an amino acid position corresponding to position 242 of a reference alpha-amylase, said variant alpha amylase having detectable alpha-amylase activity, and
 - b) at least one of an additional enzyme, a detergent, a surfactant, a chelator, an oxidizing agent, an acidulant, an alkalinizing agent, a source of peroxide, a source of hardness, a salt, a detergent complexing agent, a polymer, a stabilizing agent, or a fabric conditioner.
- Detergents, methods.

Inventions 2-12: claims 1-6 (partially), 7, 20, 24, 30, 31

As invention 1, wherein the variant alpha amylases are S242A, S242D, S242E, S242F, S242G, S242H, S242L, S242M, S242N, S242Q or S242T.

Invention 13-24: claims 1-6 (partially), 8-14, 18, 25, 32-35

As inventions 2-12, comprising further mutations.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2008/012411

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0210355	A	07-02-2002	AR 028979 A1 28-05-2003
			AU 7841501 A 13-02-2002
			CA 2416967 A1 07-02-2002
			CN 1529752 A 15-09-2004
			EP 1370648 A2 17-12-2003
			JP 2004508815 T 25-03-2004