

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
27 December 2007 (27.12.2007)

PCT

(10) International Publication Number
WO 2007/149371 A3

(51) International Patent Classification:

C07C 2/14 (2006.01) C07C 29/04 (2006.01)
C07C 9/21 (2006.01) C07C 41/06 (2006.01)
C07C 11/02 (2006.01)

(21) International Application Number:

PCT/US2007/014166

(22) International Filing Date: 15 June 2007 (15.06.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

60/814,663 16 June 2006 (16.06.2006) US

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, 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, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

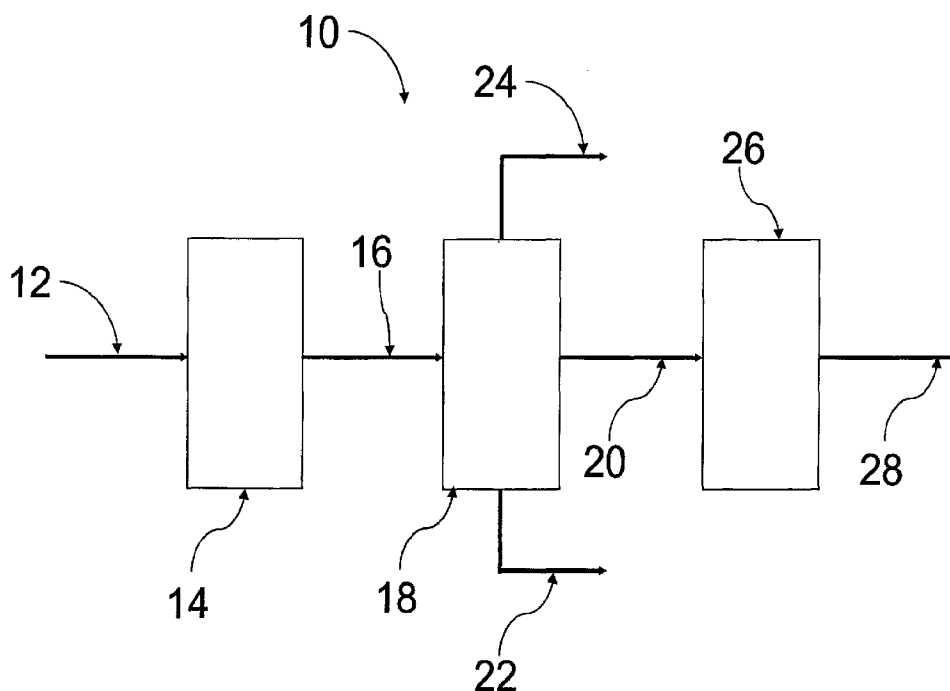
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, 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

[Continued on next page]

(54) Title: PROCESS FOR MAKING ISOOCETENES FROM DRY ISOBUTANOL



(57) Abstract: The present invention relates to a process for making isoocetenes using dry isobutanol derived from fermentation broth. The isoocetenes so produced are useful for the production of fuel additives.

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— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(88) **Date of publication of the international search report:**

28 February 2008

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2007/014166

A. CLASSIFICATION OF SUBJECT MATTER

INV. C07C2/14 C07C9/21 C07C11/02 C07C29/04 C07C41/06

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)

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 practical, search terms used)

EPO-Internal, WPI Data, BEILSTEIN Data, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	PÉTROFF A D ET AL: "De la structure du di-isobutylène de Malbot" BULLETIN DE LA SOCIETE CHIMIQUE DE FRANCE, MASSON, PARIS, FR, vol. 53, 1933, pages 327-330, XP009092312 ISSN: 0037-8968 the whole document ----- -/--	1-8

☒ 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.

G document member of the same patent family

Date of the actual completion of the international search

7 December 2007

Date of mailing of the international search report

02/01/2008

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2007/014166

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JEAN BAPTISTE SENDERENS: "Chimique Organique. Déshydratation catalytique, en phase gazeuse, des alcools forméniques en présence des bisulfates alcalins" COMPTES RENDUS HEBDOMADAIRES DES SEANCES DE L'ACADEMIE DES SCIENCES, GAUTHIER-VILLARS, PARIS,, FR, vol. 190, 1930, pages 1167-1170, XP009092311 ISSN: 0001-4036 the whole document	1-8
Y	----- IPATIEFF, MONROE: "The dehydration of the lower aliphatic alcohols in the presence of dilute aqueous solutions of acids and salts" JOURNAL OF THE AMERICAN CHEMICAL SOCIETY, vol. 66, 1944, pages 1627-1631, XP002458829 the whole document	1-8
Y	& DATABASE BEILSTEIN BEILSTEIN INSTITUTE FOR ORGANIC CHEMISTRY, FRANKFURT-MAIN, DE; 1944, IPATIEFF, MONROE: "The dehydration of the lower aliphatic alcohols in the presence of dilute aqueous solutions of acids and salts" abstract	1-8
Y	----- WO 97/03932 A (SHELL INT RESEARCH [NL]; SHELL CANADA LTD [CA]) 6 February 1997 (1997-02-06) claims 1,7 example 1 figure 1 page 7, line 3 - line 6	1-8
Y	----- FRITSCH D ET AL: "Application of a forced-flow catalytic membrane reactor for the dimerisation of isobutene" CATALYSIS TODAY, ELSEVIER, vol. 98, no. 1-2, 24 November 2004 (2004-11-24), pages 295-308, XP004640277 ISSN: 0920-5861 abstract figure 3 table 3	1-8
Y	----- EP 0 263 403 A (IDEMITSU KOSAN CO [JP]) 13 April 1988 (1988-04-13) page 1, line 4 - line 5 example 14 ----- -/--	1-8

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2007/014166

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 0 088 602 A (EXXON RESEARCH ENGINEERING CO [US]) 14 September 1983 (1983-09-14) page 15, line 20 - line 28 tables IV,XIII,XIX -----	1-8
Y	WO 03/031539 A (FORTUM OYJ [FI]; KIVI JOUNI [FI]; KARINEN REETTA [FI]; KRAUSE OUTI [FI]) 17 April 2003 (2003-04-17) claim 2 -----	6
Y	US 5 288 924 A (BEECH JR JAMES H [US] ET AL) 22 February 1994 (1994-02-22) column 3, line 3 - line 6 -----	5,8

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2007/014166

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9703932	A	06-02-1997	AU 694889 B2	30-07-1998
			AU 6658896 A	18-02-1997
			CA 2227329 A1	06-02-1997
			CN 1191526 A	26-08-1998
			CZ 9800187 A3	15-07-1998
			JP 11514337 T	07-12-1999
			NO 980259 A	20-01-1998
			ZA 9606107 A	03-02-1997
EP 0263403	A	13-04-1988	DE 3785537 D1	27-05-1993
			DE 3785537 T2	09-09-1993
			JP 1876085 C	07-10-1994
			JP 5088105 B	21-12-1993
			JP 63091078 A	21-04-1988
EP 0088602	A	14-09-1983	CA 1215333 A1	16-12-1986
WO 03031539	A	17-04-2003	FI 20011996 A	13-04-2003
US 5288924	A	22-02-1994	NONE	