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(54) Title: LIQUID FUEL COMPOSITION

(57) Abstract: Liquid fuel compositions comprising a biofuel component, respectively in the range of 0.5 to 20 vol.% of C4-C8-olefins, which C4-C8-olefins contain in the range from equal to or more than 0.02 wt% to equal to less than 100 wt% of bio-carbon, based on the total weight of carbon present in the C4-C8-olefins, and processes for producing such liquid fuel compositions



WO 2012/143568 A3

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2012/057409

A. CLASSIFICATION OF SUBJECT MATTER		
INV. C10G3/00	C10G1/08	C10G1/00 C10L1/04 C10L1/06
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) C10G B01J C10B C10L		
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.
X	FOGASSY G ET AL: "Biomass derived feedstock co-processing with vacuum gas oil for second-generation fuel production in FCC units", APPLIED CATALYSIS B: ENVIRONMENTAL, ELSEVIER, AMSTERDAM, NL, vol. 96, no. 3-4, 7 June 2010 (2010-06-07), pages 476-485, XP027013119, ISSN: 0926-3373 [retrieved on 2010-04-16] abstract	1-6, 10-12, 18,19
X	US 2010/105970 A1 (YANIK STEVE [US] ET AL) 29 April 2010 (2010-04-29) claims 1,3,6,11,15, ----- -/-	9,13-17
☒ 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 16 October 2012		Date of mailing of the international search report 25/10/2012
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 Harf, Julien

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2012/057409

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/EP2012/057409

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 2009/253948 A1 (MCCALL MICHAEL J [US] ET AL) 8 October 2009 (2009-10-08)	7,8
A	claim 1; figure 1; table 4	1-6,10, 11,18,19
A	----- US 2010/163455 A1 (HADJIGEORGE GEORGE A [US] ET AL) 1 July 2010 (2010-07-01) claims 1,11; figure 1 page 2, paragraph 29 page 8, paragraph 89	1-19
A	----- FRENCH R ET AL: "Catalytic pyrolysis of biomass for biofuels production", FUEL PROCESSING TECHNOLOGY, ELSEVIER BV, NL, vol. 91, no. 1, 1 January 2010 (2010-01-01), pages 25-32, XP026780102, ISSN: 0378-3820, DOI: 10.1016/J.FUPROC.2009.08.011 [retrieved on 2009-09-05] abstract; figures 1,3	1-19
A	----- LAPPAS A A ET AL: "Biomass pyrolysis in a circulating fluid bed reactor for the production of fuels and chemicals", FUEL, IPC SCIENCE AND TECHNOLOGY PRESS, GUILDFORD, GB, vol. 81, no. 16, 1 November 2002 (2002-11-01), pages 2087-2095, XP004374414, ISSN: 0016-2361, DOI: 10.1016/S0016-2361(02)00195-3 abstract; figure 2; tables 2,3	1-19
A	----- WO 2010/002792 A2 (KIOR INC [NL]; YANIK STEVE [US]; O'CONNOR PAUL [NL]; BARTEK ROBERT [US]) 7 January 2010 (2010-01-07) claim 1; figure 2 page 25, paragraph 109 page 26, paragraph 112-114 page 12, paragraph 55 page 13, paragraph 58 page 21, paragraph 94 -----	1-19

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2012/057409

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2010105970 A1	29-04-2010	CA 2733095 A1 CN 102197113 A EP 2340295 A2 US 2010105970 A1 WO 2010062611 A2	03-06-2010 21-09-2011 06-07-2011 29-04-2010 03-06-2010
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US 2010163455 A1	01-07-2010	CA 2684223 A1 CN 101679880 A EP 2147083 A1 JP 2010523803 A KR 20100016499 A RU 2009141848 A US 2010163455 A1 WO 2008127956 A1	23-10-2008 24-03-2010 27-01-2010 15-07-2010 12-02-2010 20-05-2011 01-07-2010 23-10-2008
WO 2010002792 A2	07-01-2010	US 2012022307 A1 WO 2010002792 A2	26-01-2012 07-01-2010

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-6(completely); 10, 11, 18, 19(partially)

liquid fuel composition, suitable for use in a spark-ignition engine, comprising in the range of 0.5 to 20 vol.% of C4-C8-olefins, which C4-C8-olefins contain in the range from equal to or more than 0.02 wt% to equal to or less than 100 wt% of bio-carbon, based on the total weight of carbon present in the C4-C8-olefin; previous liquid fuel composition further comprising a Fisher-Tropsch fuel component or a phenolic antioxidant comprising phenol and/or alkyl-substituted phenols containing bio-carbon; process for operating an engine involving introducing into a combustion chamber of the engine this liquid fuel composition; use of this liquid fuel composition in a transportation vehicle

2. claims: 7, 8(completely); 10, 11, 18, 19(partially)

liquid fuel composition comprising i) a conventional fuel component, ii) a biofuel component comprising from equal to or more than 0.01 wt% to equal to or less than 80 wt% olefins, from equal to or more than 0.01 wt% to equal to or less than 20 wt% C4+ oxygen-containing hydrocarbons, from equal to or more than 5 wt% to equal to or less than 80 wt% linear or branched paraffins, from equal to or more than 0.01 wt% to equal to or less than 80 wt% cycloparaffins, from equal to or more than 0.01 wt% to equal to or less than 80 wt% aromatics, based on the total weight of the biofuel component, which biofuel component comprises in the range from equal to or more than 0.02 wt% to equal to or less than 50 wt% of bio-carbon, based on the total weight of carbon present in the biofuel component; previous liquid fuel composition further comprising a Fisher-Tropsch fuel component or a phenolic antioxidant comprising phenol and/or alkyl-substituted phenols containing bio-carbon; process for operating an engine involving introducing into a combustion chamber of the engine this liquid fuel composition; use of this liquid fuel composition in a transportation vehicle

3. claims: 9, 13-17(completely); 10, 11(partially)

liquid fuel composition comprising a biofuel component, which biofuel component comprises, consists of or is derived from a fraction of one or more cracking products produced by catalytic cracking of a biomass source, wherein the fraction is chosen from the group consisting of light cycle oil, naphtha products, fractions thereof and/or mixtures thereof; previous liquid fuel composition further comprising a Fisher-Tropsch fuel component or a phenolic antioxidant comprising phenol and/or alkyl-substituted phenols containing bio-carbon; a process for preparing a liquid fuel

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

composition comprising a) contacting a biomass material with a catalytic cracking catalyst at a temperature of more than 400°C in a catalytic cracking reactor to obtain one or more cracked products, b) fractionating the one or more cracked products to obtain a fraction chosen from the group consisting of light cycle oil, naphtha products, fractions thereof and mixtures thereof to obtain a fraction, c) using the fraction obtained in step b) as a biofuel component and/or converting the fraction obtained in step b) to a biofuel component and d) blending the biofuel component with one or more other components to obtain a liquid fuel composition

4. claim: 12

liquid fuel composition comprising a conventional fuel component and a phenolic antioxidant comprising phenol and/or alkyl-substituted phenols containing bio-carbon
