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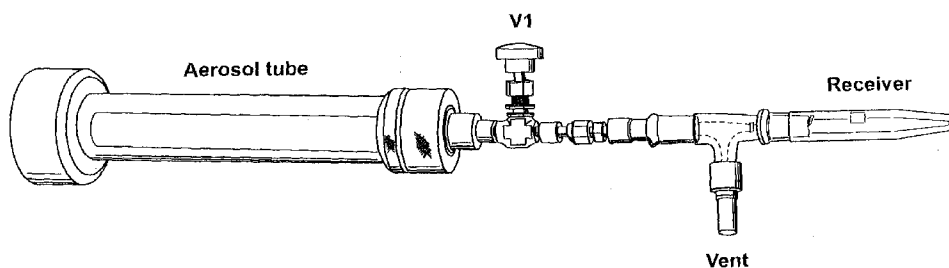
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31 July 2008

(54) Title: EXTRACTION PROCESS AND PURIFICATION PROCESS



(57) Abstract: A process for extracting a compound or composition of matter from a raw material containing that compound or composition as a constituent part is described. The process comprises the steps of (1) contacting the raw material with an extraction solvent comprising at least one fluorocarbon selected from the pentafluoropropenes and fluorinated cyclopropanes, so as to extract the compound or composition from the raw material into the solvent and (2) separating the solvent containing the extracted compound or composition from the raw material. Also described is a purification process for treating a crude composition comprising one or more undesired compounds and one or more desired compounds so as to produce a purified composition comprising an increased concentration of the one or more desired compounds and a reduced concentration of the one or more undesired compounds. The purification process comprises the steps of (1) contacting the crude composition with a solid adsorbent, (2) eluting the solid adsorbent with which the crude composition has been contacted with a solvent comprising at least one fluorocarbon selected from the (hydro) fluoropropenes and fluorinated cyclopropanes, and (3) collecting a solvent eluate containing the purified composition from the solid adsorbent. In a particular aspect, the purification process is a high performance liquid chromatography process.



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INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER
 INV. B01D11/02 B01D15/08 C11B9/02 C07C23/04

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)
 C09K C11B B01D 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

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	US 2007/007488 A1 (SINGH RAJIV R [US] ET AL) 11 January 2007 (2007-01-11) paragraphs [0021] - [0023], [0118], [0147]; claim 49	1-8, 10, 11
X	US 2004/256594 A1 (SINGH RAJIV R [US] ET AL) 23 December 2004 (2004-12-23) paragraph [0076]; claim 10	1-8, 10, 11
A	EP 0 616 821 A (ADVANCED PHYTONICS LTD [GB]) 28 September 1994 (1994-09-28) cited in the application the whole document	
P, X	GB 2 437 373 A (INEOS FLUOR HOLDINGS LTD [GB]) 24 October 2007 (2007-10-24) page 5, lines 1-16; claims 1,2,60,62,63 page 13, lines 5-22	1-7, 9-11
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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.
 - *8* document member of the same patent family

Date of the actual completion of the international search 30 May 2008	Date of mailing of the international search report 11/06/2008
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Haderlein, Andreas
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INTERNATIONAL SEARCH REPORT

International application No
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
E	WO 2007/144623 A (INEOS FLUOR HOLDINGS LTD [GB]; LOW ROBERT ELLIOTT [GB]; CORR STUART [G] 21 December 2007 (2007-12-21) page 4, lines 6-25; claims 7,8,36,37 -----	1-7,9-11
X	US 2003/157009 A1 (CORR STUART [GB] ET AL) 21 August 2003 (2003-08-21) paragraph [0046]; claims -----	12-16, 19,20, 29-32,34
A	WO 2004/082800 A (INEOS FLUOR HOLDINGS LTD [GB]; CORR STUART [GB]) 30 September 2004 (2004-09-30) examples -----	12-16, 19-25, 29-34
A	EP 1 655 355 A (AIR PROD & CHEM [US]) 10 May 2006 (2006-05-10) claims 1-3 -----	
A	US 2 712 008 A (KIRCHNER JUSTUS G ET AL) 28 June 1955 (1955-06-28) claims -----	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2007/004799

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.:
1-16, 19-25(part), 29-34(part)

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-7(part),8,10(part),11(part)

The first invention concerns an extraction process using pentafluoropropene as an extractant.

2. claims: 1-7(part),9,10(part),11(part)

The second invention concerns an extraction process using cyclopropene as an extractant.

3. claims: 12-16(part),19-25(part),29-32(part),34(part)

The third invention concerns a process for treating a crude composition comprising (i) an adsorption step, (iia) an elution step using a (hydro)fluoropropene as eluting agent, and (iii) collecting solvent eluate.

4. claims: 12-16(part),19-25(part),33(part),34(part)

The fourth invention concerns a process for treating a crude composition comprising (i) an adsorption step, (iib) an elution step using a fluorinated cyclopropane as eluting agent, and (iii) collecting solvent eluate.

5. claims: 17,18,19-25(part),29-32(part),34(part)

The fifth invention concerns a process for treating a crude composition containing (iv) terpenes comprising (i) an adsorption step on a (v) polar adsorbent, (iia) an elution step using a (hydro)fluoropropene as eluting agent, and (iii) collecting solvent eluate.

6. claims: 17,18,19-25(part),33(part),34(part)

The sixth invention concerns a process for treating a crude composition containing (iv) terpenes comprising (i) an adsorption step on a (v) polar adsorbent, (iib) an elution step using a fluorinated cyclopropane as eluting agent, and (iii) collecting solvent eluate.

7. claims: 26-28,29-32(part),34(part)

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

The seventh invention concerns a (vi) chromatography process for treating a crude composition comprising (vii) contacting step on a chromatography column, (iia) an elution step using a (hydro)fluoropropene as eluting agent, and (iii) collecting solvent eluate.

8. claims: 26-28,33(part),34(part)

The eight invention concerns a (vi) chromatography process for treating a crude composition comprising (vii) contacting step on a chromatography column, (iib) an elution step using a fluorinated cyclopropane as eluting agent, and (iii) collecting solvent eluate.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2007/004799

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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