

PATENT COOPERATION TREATY

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

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

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

International application No.
PCT/HU2016/050042

International filing date (day/month/year)
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01.09.2015

International Patent Classification (IPC) or both national classification and IPC
INV. G01N30/42 B01D15/18

Applicant
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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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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>9, 11, 18-21</u>
	No: Claims	<u>1-8, 10, 12-17</u>
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

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

1 Reference is made to the following documents:

D1: US 2004/173534 A1 (MARGRAFF RODOLPHE [FR] ET AL) 9

September 2004 cited in the application

D2: US 4 422 941 A (VAUGHAN JR MAURICE H [US] ET AL) 27 December 1983

D3: RODOLPHE MARGRAFFA ET AL: "Partitron 25, a Multi-Purpose Industrial Centrifugal Partition Chromatograph: Rotor Design and Preliminary Results on Efficiency and Stationary Phase Retention", JOURNAL OF LIQUID CHROMATOGRAPHY AND RELATED TECHNOLOGIES, vol. 28, no. 12-13, 31 August 2004, pages 1893-1902, XP009168822

D4: CH 655 577 A5 30 April 1986

D5: US 3 853 765 A (TANIMURA T ET AL) 10 December 1974

D6: FR 2 883 770 A1 (KROMATON SARL SARL [FR]) 6 October 2006

2 **Re Item V**

2.1 In so far as it could be understood (*see comments under item VIII*), the subject matter of **claim 1** lacks novelty over D1 within the meaning of Art. 33(2) PCT, and therefore fails to satisfy the requirements of Art. 33(1) PCT. The reasons are the following:

2.2 D1 discloses in figure 2 and corresponding paragraphs 38-49 an extraction cell (2) for a centrifugal partition chromatograph (*see paragraph 1*), which extraction cell contains an extraction chamber (*interior of cell 2*) delimited by a cell wall (*wall of cell 2*) and accommodates a liquid stationary phase, and it has a liquid inlet opening (*opening in the end face of cell 2 facing the exterior wall of cylindrical body 1*) and a liquid outlet opening (*opening in the end face of cell 2 facing the inner wall of cylindrical body 1*) serving to let in and out the liquid mobile phase to be made to flow through the extraction cell (*see paragraphs 45-48*), characterised by that it contains an extraction chamber established as a tubular body (*see figures 5a, 5b*), and a liquid inlet plug that includes a liquid inlet opening (*first closing means 3 with plug 30 and seal 33*) and a liquid outlet plug that includes a liquid outlet opening (*second closing*

means 4 with cover part 40), that can be attached to the extraction chamber (see paragraphs 45-48 disclosing different attachment means including strapping, threads etc.).

- 2.3 The subject matter of **claim 1** is also anticipated by documents D3-D6, and therefore fails to satisfy the requirements of novelty pursuant to Art. 33(2) PCT, with the following passages of the prior art being considered relevant:

D3: see extraction cell of figure 2 which corresponds to that of D1 with the exception that the cell in D2 does not appear to be removable from the rotor

D4: see two extraction cells 5 mounted in series in figure 1 with removable end plugs disclosed (*see 'Stopfen' on page 3 column 1 lines 22-26 and claim 4*)

D5: see figure 1 with columns 13 read onto the extraction cells

D6: see figure 10 with extraction cell 7 and insert 16 wherein the wall 17 may be read onto the inlet plug and wall 21 onto the outlet plug

- 2.4 In so far as it could be understood (*see comments under item VIII below*), the subject matter of claim 18 lacks an inventive step in view of D1, contrary to the requirements of Art. 33(1)(3) PCT. D1 discloses a method for producing extraction cell that maybe used in a centrifugal partition chromatograph, during which;
- the extraction cells are filled with liquid stationary phase (*see paragraph 3*),
 - liquid mobile phase is made to flow through the stationary phase (*see paragraph 3*), characterised by that:
 - ~~the average diameter of the droplets of the mobile phase breaking up into droplets and penetrating the stationary phase is determined,~~
 - an insert through which liquid may pass through is arranged in the extraction cell that has internal passages (*see paragraph 52*) ~~and the average diameter of the passages is 1-30 times, preferably 1-20 times, even more preferably 4-10 times the average diameter of the droplets.~~

D1 does not disclose the features that are barred above. The subject matter of claim 18 is therefore new over D1. There does not however appear to be any technical effect associated with the choice of the average diameter of the passages of the insert. Moreover this range is very wide. Hence, no objective

technical problem appears to be solved by the steps of determining the average diameter of the droplets and selecting the insert based on said average diameter. If no objective technical problem is solved, the subject matter cannot be deemed to be inventive.

2.5 The same argument applies with respect to D3.

2.6 In so far as it could be understood (*see comments under item VIII below*), the subject matter of **claims 2, 4, 6-8, 10, 12-17** also lacks novelty over D1, contrary to the requirements of Art. 33(1)(2) PCT, with the additional features claimed disclosed in the following passages of D1:

Claims 2, 4: The porous dispersion element may be read onto the bulk insert - see paragraph 52. While D1 makes no mention of the diameter of the pores, there is no clear indication from claim 2 either what said diameter may be, since it varies depending on the manner in which the apparatus is used. Hence the feature concerning the average diameter of must be set aside when assessing the claim for novelty.

Claim 6: see paragraph 52, which discloses that the lining braids encourage dispersion of the mobile phase in the cell. This equates to reducing the effect of the Coriolis force on the mobile phase - see also second last paragraph on page 2 of the present description

Claim 7: see paragraph 25

Claim 8: see paragraphs 45-48

Claim 10: One bore is disclosed in the inlet plug of D1 - see figure 2

Claims 12, 13: see paragraphs 45-48

Claims 14, 15: see figures 1 and 2

Claims 16, 17: In view of the claim wording (*see comments under item VIII*), each cell is individually removable from the body¹ and can therefore be considered to form an individually removable module.

2.7 The subject matter of **claim 5** lacks novelty over figure 3 of D3, contrary to the requirements of Art. 33(1)(2) PCT.

- 2.8 In so far as it could be understood, the subject matter of **claim 3** is considered obvious in view of D1, contrary to the requirements of Art. 33(1)(3) PCT. D1 does not disclose by what means the cells 2 are manufactured. D1 merely discloses that the cells may be formed of stainless steel or titanium or a fluorinated polymer (*see paragraph 25*). The technologies cited in the claim are however standard technologies for manufacturing a regular cylinder, from which the skilled person would choose without any inventive effort since the cells according to a preferred embodiment of D1 are regular cylinders (*see figure 5a and paragraph 52*). Note that the discussion on page 2 of the present description concerning waste production in the manufacturing process of D1 is concerned with waste production of the cylindrical body 1 when it is drilled, not the extraction cells 2.
- 2.9 The subject matter of **claim 9** is obvious in view of D1, contrary to the requirements of Art. 33(1)(3) PCT. D1 discloses cylindrical body 1 as the external supporting structure. Whilst D1 does not disclose pits on the external surface of the cell wall, this is considered to be an obvious workshop modification, not involving any inventive skill.
- 2.10 The subject matter of **claim 11** lacks an inventive step in view of D2 combined with D1, contrary to the requirements of Art. 33(1)(3) PCT with D2 disclosing a conical section at the outlet end of an extraction cell - see figure 17.
- 2.11 The subject matter of **claims 19-21** lacks an inventive step in view of D1 or D3, contrary to the requirements of Art. 33(1)(3) PCT with the additional features claimed disclosed in the following passages:
- Claim 19:** well known manner of calculating the diameter of the droplets
- Claim 20:** 3% of the volume of the extraction cell is occupied by the insert according to claim 1 - see paragraph 52 of D1
- Claim 21:** see figure 3 of D3

3 **Re Item VII**

The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

4 **Re Item VIII**

4.1 The application does not meet the requirements of Article 6 PCT, because claims 1 - 21 are not clear.

4.2 According to method claim 18, an insert is deemed essential to the definition of the invention. This insert is however not present in the extraction cell of claim 1. The resulting discrepancy between features considered essential to the definition of the invention according to independent apparatus claim 1 and those considered essential to the definition of the invention according to independent method claim 18 gives rise to a lack of clarity.

4.3 In claim 3, it is not clear what limitations the term 'waste-free' imply. None of the exemplary technologies cited in the claim (*see - '3D printing,... metal casting'*) are truly waste-free.

4.4 Claim 18 is also confusing in that it is nominally directed to a method of producing an extraction cell. However, the first step specifies that the extraction cells are filled with liquid stationary phase. In other words, the extraction cells have already been produced in contradiction with the stated aim of the method. This renders the claim unclear.

4.5 Moreover, there is no indication in claim 18 of the nature of the extraction cells that are filled with liquid stationary phase. Are these extraction cells of claim 1 or some other extraction cells entirely?

4.6 Finally, claim 18 requires a plurality of extraction cells to be filled with liquid stationary phase and subsequently, the mobile phase to be flowed through the extraction cells. There is however no indication of the relationship

between the respective extraction cells. Are they mounted in series as in depicted in figure 9? Are they mounted in parallel? Is there any fluid connection at all between the extraction cells?

- 4.7 Claim 2 attempts to define the apparatus in terms of a result-to-be-achieved, said result depending on the way in which the apparatus is used. Specifically, the average diameter of the droplets is dependent on the nature of the stationary and mobile phases (their viscosities and densities) as well as the flow velocity of the mobile phase, the angular velocity of the rotation of the extraction cell and the distance of the extraction cell from the axis of rotation (*see Stokes's formula in the description*). Hence, the average diameter of the droplets formed varies depending on the manner in which the apparatus is used, and therefore also the average diameter of the insert varies. It is therefore not possible to say in advance which inserts would fall within the scope of claim 2, and which not, rendering claim 2 unclear.
- 4.8 The subject matter which results from the dependency of claims 4-6 on claim 1 is unclear because the insert is first mentioned in claim 2. The feature of 'the insert' is therefore undefined in the subject matter which results from the dependency of claims 4-6 on claim 1.
- 4.9 Claims 5 and 21 are unclear because it is not apparent if the term in brackets, viz. 'wound up' forms part of the claimed apparatus/method or not.
- 4.10 Claim 6 also attempts to define the subject matter in terms of the result to be achieved, viz. reducing the effect of the Coriolis force when the chromatograph is in use, rather than clearly specifying the apparatus in terms of its structural features.
- 4.11 Claim 9 is unclear because the 'external supporting structure' has no antecedent in the higher-ordered claims, rendering the claimed subject matter unclear.

- 4.12 One of the additional features of claim 10, viz. that divide the liquid made to flow through it into several liquid jets, relates to a method of using an apparatus. The intended limitations are therefore unclear, rendering the claimed apparatus unclear. In addition, this feature is confusing and unclear taken in combination with the other additional feature of claim 10, viz. that the liquid inlet plug contains one bore. How are several liquid jets formed by means of one bore?
- 4.13 Claim 14 is unclear because it has been drafted as being dependent on claims 1-15, i.e. it is dependent on itself and on one lower-ordered claim 15.
- 4.14 Claim 16 is also unclear because the claim wording seems to imply that each of the series-connected extraction cells forms an individually removable module rather than what the applicant presumably intended, viz. that several series-connected extraction cells together form one removable module.