

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

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

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

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/US2016/051272

International filing date (day/month/year)
12.09.2016

Priority date (day/month/year)
18.09.2015

International Patent Classification (IPC) or both national classification and IPC
INV. C09K8/508 C09K8/516 C09K8/76 C09K8/80 C09K8/88 C09K8/92

Applicant
BAKER HUGHES INCORPORATED

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 43bis.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 66.1bis(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.

Name and mailing address of the ISA:



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Date of completion of
this opinion

see form
PCT/ISA/210

Authorized Officer

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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>1-20</u>
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-20</u>
Industrial applicability (IA)	Yes: Claims	<u>1-20</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

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

- D1 US 2012/024526 A1 (LIANG FENG [US] ET AL) 2 February 2012 (2012-02-02)
- D2 EP 1 881 036 A1 (KANEKA CORP [JP]) 23 January 2008 (2008-01-23)
- D3 EP 2 330 157 A1 (KANEKA CORP [JP]) 8 June 2011 (2011-06-08)cited in the application
- D4 US 2015/083423 A1 (BRANNON HAROLD DEAN [US] ET AL) 26 March 2015 (2015-03-26)

1 Novelty :

- 1.1 Since none of the documents cited in the search report disclose all the features of independent **claims 1, 7, 16**, it is considered that said claim as well as dependent **claims 2-6, 8-15, 17-20** are novel over said prior art documents.

2 Inventive step :

- 2.1 **Document D1**, considered as being the closest prior art, discloses a method for stimulating subterranean formations by using a degradable diverter (see claims) comprising a degradable polymeric coating on a degradable plasticizer.
As possible degradable polymer suitable as diverting agent poly(hydroxybutyrate) is explicitly cited in the claims (See claim 4).
Said method comprises the step of introducing said divertier into perforations/ fractures in order to block the conductivity of the diverted zone, passing another low-viscosity fluid into the zone at high rate, allowing the particulates to dissolve, in order to restore permeability of the treated zone (see claims 1, 10).

- 2.2 Present claim 1 differs from that known disclosure in the nature of the polymer used for the diverting agent, i.e. by the use of a specific copolymer based on 3-hydroxybutyrate and 3-hydroxyhexanoate monomers, and not poly(hydroxybutyrate) only.

The technical problem solved by the present application is considered to be the provision of a biodegradable diverting agent.

- 2.3 Hence, the skilled person wanting to solve the aforementioned technical problem would look for biodegradable known copolymers, independently from the technical domain, that could be used as biodegradable alternative to the polymers/copolymers known from the closest prior art, in particular biodegradable known polymers based on hydroxybutyrate monomers.

Therefore, he would consider the teaching of **document D2**, disclosing biodegradable polymer compositions (see claims), wherein said composition comprises a copolymer of 3-hydroxybutyrate-co-3-hydroxyhexanoate.

Document D3, also cited in the present application, discloses the same teaching, and the same biodegradable copolymers.

Therefore, present **claim 1** is considered as being obvious from the disclosure of D1 combined with the teaching of document D2, and therefore present claim 1 is not considered as being inventive over the cited prior art.

- 2.4 For the same reasons, mutatis mutandis, independent **claims 7 or 16**, are also not considered as being inventive, since based on the same biodegradable copolymer.
- 2.5 Dependent **claims 2-6, 8-15, 17-20** do not appear to contain any additional features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT with respect to inventive step.

Re Item VII

Certain defects in the international application

- 1 The used expression "*incorporation by reference*" or "*claims benefit*", as mentioned on pages 1, 10, 13, 15-16 in the present description, is not recognised in the PCT and should be deleted.
- 2 The units "°F", "mesh", "psi" employed in **claims 4-6, 10-12**, and on pages 2-5, 7, 10, 12, 16, 19-22 are not additionally expressed in terms of the units stipulated by Rule 10.1/(a)/and/(b) PCT. This should be corrected.
- 3 The applicant is requested to delete the sentence of the description on page 7 referring to the wording "*spirit of the invention*", since said wording is vague and unclear.
- 4 The applicant is requested to delete the sentence of the description on page 22 relating to redefinition of ranges.
Indeed, only the explicitly cited end-points of ranges are considered as being specifically disclosed, and not, as stated in the description, any number included in the range.

Re Item VIII

Certain observations on the international application

- 1 Although **method claims 1, 7 and 16** have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought.
The aforementioned claims therefore lack conciseness and as such do not meet the requirements of Article 6 PCT.
The applicant should limit his set of claims to only one independent method claim.
- 2 In present independent **claims 1, 7 and 16**, the wording "*n is 1 and 3*", as used to define said index *n* in the formula *R* representing an alkyl group having the formula C_nH_{2n+1} , seems unclear. Indeed, *n* cannot be both together, but either 1 or 3.

- 3 The term "about" used in **claims 4-6, 10-12** is vague and unclear and leaves the reader in doubt as to the meaning of the technical features to which it refers, thereby rendering the definition of the subject-matter of said claims unclear.