

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:
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PCT

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
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No. PCT/US2016/039492	International filing date (day/month/year) 27.06.2016	Priority date (day/month/year) 30.06.2015
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International Patent Classification (IPC) or both national classification and IPC
INV. C09K8/80

Applicant
DOW GLOBAL TECHNOLOGIES LLC

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.

Name and mailing address of the ISA:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465	Date of completion of this opinion see form PCT/ISA/210	Authorized Officer Munro, Brian Telephone No. +49 89 2399-0	
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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>7</u>
	No: Claims	<u>1-6, 8</u>
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-8</u>
Industrial applicability (IA)	Yes: Claims	<u>1-8</u>
	No: Claims	

2. Citations and explanations

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 5 728 302 A (CONNOR JOHN A [US] ET AL) 17 March 1998
(1998-03-17)
- D2 US 2013/056204 A1 (MCDANIEL ROBERT RAY [US] ET AL) 7 March
2013 (2013-03-07)
- D3 US 2005/194135 A1 (NGUYEN PHILIP D [US] ET AL) 8 September 2005
(2005-09-08)
- D4 US 2013/186624 A1 (MCCRARY AVIS LLOYD [US] ET AL) 25 July 2013
(2013-07-25)
- D5 US 5 196 124 A (CONNOR JOHN A [US] ET AL) 23 March 1993
(1993-03-23)
- D6 WO 94/06998 A1 (UNION OIL CO [US]) 31 March 1994 (1994-03-31)
- D7 EP 2 444 377 A1 (GEN ELECTRIC [US]) 25 April 2012 (2012-04-25)
- D8 US 2013/180714 A1 (NEVIN DONALD [US]) 18 July 2013 (2013-07-18)

Novelty (Art. 33(2) PCT)

The present application does not appear to meet the criteria of Article 33(2) PCT, because the subject-matter of claims 1-6 & 8 does not appear to be new. The reasoning is as follows:

Document D1 (col.6, l.40-67) discloses an ion exchange resins for the removal of radionuclides one example of which comprises pure BaSO₄ crystals. Furthermore, according to D1, the resins may be bonded to the surface of sand, **proppant** or gravel pack particulates. Thus, D1 appears to disclose proppants coated with a polymer comprising BaSO₄ for removing heavy metals. Thus, D1 appears to be prejudicial to the novelty of claims 1-4 and 8.

Document D2 ((whole document - see in particular, para. 0024, 0031-0035 & 0114) discloses coated proppants whereby the coating comprises a contaminant removal component. The contaminant removal component may be a zeolite. Zeolites are crystalline and thus constitute "*heavy metal recovery crystals*". The same types of polymer for the coating also appear to be anticipated. Thus, document D2 appears to be prejudicial to the novelty of claims 1-6 & 8 (Art. 33(2) PCT).

Document D3 (paragraphs 0032, 0034 & 0035; claim 17) discloses proppants provided with tacky polymeric coatings, which are then subsequently coated with a partitioning agent, i.a. barium sulphate. D3 discloses coated proppants with barium sulphate particles at least partly embedded therein. Thus, document D3 appears to be prejudicial to the novelty of claims 1-4 & 8 (Art. 33(2) PCT).

Inventive Step (Art.33(3) PCT)

Notwithstanding the novelty objections raised above, the present application does not meet the criteria of Article 33(3) PCT, because the subject-matter of the claims does not involve an inventive step. The reasoning is as follows:

Documents D2 (whole document - see in particular, para. 0024, 0031-0035 & 0114) & D4 (whole document - see in particular paragraph 0090 & the claims) disclose proppants having a coating, whereby the coating contains an agent for removing heavy metals. D2 refers in particular to zeolites and ion exchange resins. However, a person skilled in the art looking for an alternative heavy metal (radium) removing agent would realise from D1 (col.6, l.40-67), D5 (claims 8 + 14 + 15; col. 5, l.25-34; col. 6, l. 3-28) and D6 (the whole document) that barium sulphate or manganese dioxide could be used instead. Moreover, in D2 and D4, the same types of polymers appear to be used. With regard to the subject-matter of claim 7, in particular, the use of a polyurethane/epoxy hybrid mix does not appear to be associated with a surprising technical effect and in any case, D2 (paragraph 0034) also mentions using various resins including phenolic and epoxy resins, amongst others, and their combinations.

Thus, the subject-matter of claims 1-8 does not appear to involve an inventive step in the sense of Article 33(3) PCT.