

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

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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/US2020/054731

International filing date (day/month/year)
08.10.2020

Priority date (day/month/year)
10.10.2019

International Patent Classification (IPC) or both national classification and IPC
INV. C09K8/584 C09K8/592 E21B43/24

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 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

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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>1-7</u>
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-7</u>
Industrial applicability (IA)	Yes: Claims	<u>1-7</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

Re Item V

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

1 Reference is made to the following document:

D1 WO 2016/176385 A1 (DOW GLOBAL TECHNOLOGIES LLC [US];
ROHM & HAAS [US]) 3 November 2016 (2016-11-03)

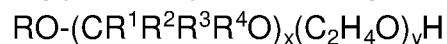
2 The present application does not meet the criteria of Article 33(3) PCT, because the subject-matter of claim 1 does not involve an inventive step.

Document D1 is regarded as being the prior art closest to the subject-matter of claim 1, and discloses (cf. page 3, line 6 through page 5, line 5, page 7, line 16 through page 9, line 24, Examples, claims) a method of enhanced oil recovery from a subterranean reservoir, the method comprising:

co-injecting a gas and a foam formulation into the subterranean reservoir, wherein the foam formulation comprises:

a sulfonate composition comprising at least one sulfonate selected from the sulfonates of Formula I to Formula IV as recited in present claim 1; and

a glycol compound having a formula:



where R is selected from the group of linear alkyl, branched alkyl, cyclic alkyl, and alkaryl groups having 1 to 30 carbon atoms;

R¹, R², R³ and R⁴ are each independently selected from the group of H, branched alkyl, linear alkyl, aralkyl, cyclic alkyl, or alkaryl groups having 1 to 6 carbon atoms, with the proviso that one or more of the following apply: that R¹, R², R³ and R⁴ cannot all be H, the sum of carbon atoms in R¹ + R² + R³ + R⁴ is less than or equal to about 8;

x is from 1 to 20 inclusive when the sum of carbon atoms in R¹ + R² + R³ + R⁴ is equal to 1 or x is an integer from 1 to 2 inclusive when the sum of carbon atoms in R¹ + R² + R³ + R⁴ is equal to 2 to 8; and

y is an integer from 0 to 99; and
water.

It must be observed that if one makes the following selections from D1:

R is alkyl,

CR¹R²R³R⁴O is C₂H₄O (the sum of carbon atoms in R¹ + R² + R³ + R⁴ is equal to 1),

x is 1, and

y is 0,

then one obtains the glycol ether structure as defined in present claim 1,
wherein

R is alkyl,

m is 0,

R₂ is H,

R₃ is H, and

n is 1.

The subject-matter of claim 1 therefore differs from this known method in that according to present claim 1, the gas is steam. The subject-matter of claims 1-7 is therefore new.

The problem to be solved by the present invention may therefore be regarded as the provision of an alternative method of enhanced oil recovery from a subterranean reservoir, the method comprising:
co-injecting a gas and a foam formulation into the subterranean reservoir,
wherein the foam formulation comprises:
a sulfonate composition comprising at least one sulfonate selected from the sulfonates of Formula I to Formula IV as recited in present claim 1; and
a glycol compound.

The solution proposed in claim 1 of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

In enhanced oil recovery operations the use of steam as the gaseous medium is common practice. Therefore, the selection of steam as the gaseous medium is merely one of several straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill, in order to solve the problem posed.

- 3 The same reasoning applies, mutatis mutandis, to the subject-matter of the corresponding independent claim 7, which therefore is also considered not inventive.

- 4 Dependent claims 2 to 6 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, because these features are either known from the prior art or they constitute the general knowledge of the person skilled in the art.

In particular:

Claims 2-5: The amounts of the sulfonates within the sulfonate composition, the amount of the sulfonate composition within the foam formulation, the amount of the glycol compound within the foam formulation and the amount of water within the foam formulation can be appropriately selected by the skilled person according to the particular circumstances.

Claim 6: The suitable temperature at which the co-injecting of the gas and the foam formulation takes place can be appropriately selected by the skilled person according to the particular circumstances.

Re Item VII

Certain defects in the international application

- 1 In Table 1, the composition of Examples 1, 2 and 3 appears to be identical.