

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

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

To:

see form PCT/ISA/220

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/US2016/035167

International filing date (day/month/year)
01.06.2016

Priority date (day/month/year)
29.06.2015

International Patent Classification (IPC) or both national classification and IPC
INV. C01B39/02 B01J29/70 C01B39/30

Applicant
CHEVRON U.S.A. INC.

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:



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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>3</u> |
| | No: Claims | <u>1, 2, 4-7</u> |
| 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. 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 OCCELLI M L ET AL: "QUATERNARY AMMONIUM CATION EFFECTS ON THE CRYSTALLIZATION OF OFFRETITE-ERIONITE TYPE ZEOLITES: PART 1. SYNTHESIS AND CATALYSTIC PROPERTIES", ZEOLITES, ELSEVIER SCIENCE PUBLISHING, US, vol. 7, no. 3, 1 January 1987, pages 265-271, XP008043268

D2 US 4 331 643 A (RUBIN MAE K ET AL) 25 May 1982

2 **Re Item V**

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

2.1 **Novelty (Art. 33(2) PCT)**

The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of **claims 1, 2 and 4-7** is not new in the sense of Article 33(2) PCT.

2.1.1 Concerning **claim 1** document D1 discloses:

- a method of preparing an aluminosilicate zeolite (crystalline aluminosilicate of the erionite type in D1, p.265 right-hand column line 8), comprising:
 - (a) preparing a reaction mixture containing:
 - (1) a source of silicon oxide (colloidal silica in D1 p.266 left-hand column line 2);
 - (2) a source of aluminum oxide (NaAlO_2 in D1 p.266 left-hand column line 4);
 - (3) a source of an alkali metal (M) (NaOH and KOH in D1 p.266 left-hand column line 4);
 - (4) a structure directing agent (Q) selected from trimethylphenylammonium cations, cationic 1,4-diazabicyclo[2.2.2]octane, and combinations thereof (DABCO in D1, p.265 right-hand column lines 17-18 and p.266 left-hand column lines 4-5);
 - (5) hydroxide ions (NaOH and KOH in D1 p.266 left-hand column line 4); and

- (6) water (D1 p.266 left-hand column line 4); and
- (b) subjecting the reaction mixture to crystallization condition sufficient to form crystals of the zeolite (D1 p.266 right-hand column lines 1-2).

Although D1 does not explicitly mention the name SSZ-98 of the formed material, nor does it show the XRD of the obtained material, the same method should lead to the same material, and as it does disclose that an erionite-type structure can be made it is implicitly disclosed in D1 that this material is obtained. If this is not the case, the method of claim 1 lacks an essential feature and does not meet the requirement following from Article 6 PCT taken in combination with Rule 6.3(b) PCT that any independent claim must contain all the technical features essential to the definition of the invention.

Therefore, the subject-matter of **claim 1** lacks novelty (Art. 33(2) PCT).

2.1.2 The additional features set out in dependent **claims 2 and 4** are also anticipated by document D1:

- **claim 2:** the zeolite is prepared from a reaction mixture comprising, in terms of mole ratios, the following (D1, p.265 right-hand column lines 17-23)

| | |
|--|--------------|
| SiO ₂ /Al ₂ O ₃ | 10 to 100 |
| M/SiO ₂ | 0.05 to 0.50 |
| Q/SiO ₂ | 0.10 to 0.70 |
| OH/SiO ₂ | 0.20 to 1.00 |
| H ₂ O/SiO ₂ | 5 to 50. |

- **claim 4:** the alkali metal is selected from sodium, potassium, and combinations thereof (NaOH and KOH in D1 p.266 left-hand column line 4).

Therefore, the subject-matter of claims 2 and 4 lacks novelty (Art. 33(2) PCT).

2.1.3 As the method to make the material is anticipated by D1 (see points 2.1.1 and 2.1.2 above) the obtained product is also known from D1 which concerning **claim 5** discloses:

- an aluminosilicate SSZ-98 zeolite comprising within its pore structure a cation selected from trimethylphenylammonium cations, cationic 1,4-diazabicyclo[2.2.2]octane, and combinations thereof (D1, p.265 right-hand column line 8 to p.266 right-hand column line 4 and Tables 1, 2 and 4)

2.1.4 The additional features set out in dependent **claims 6 and 7** are also anticipated by document D1:

- **claim 6**: the zeolite has a $\text{SiO}_2/\text{Al}_2\text{O}_3$ mole ratio of from 10 to 50 (D1, p. 265 right-hand column line 8 to p.266 right-hand column line 4 and Tables 1, 2 and 4).
- **claim 7**: the zeolite has a $\text{SiO}_2/\text{Al}_2\text{O}_3$ mole ratio of from 10 to 20 (D1, p. 265 right-hand column line 8 to p.266 right-hand column line 4 and Tables 1, 2 and 4).

Therefore, the subject-matter of claims 6 and 7 lacks novelty (Art. 33(2) PCT).

2.1.5 ***Inventive step (Art. 33(3) PCT)***

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

2.1.6 Dependent **claim 3** does not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step in that the additional features of claim 3 are already known and/or appear to represent mere design options obvious to the person skilled in the art which are not associated with an unexpected technical effect (see passages cited in the international search report for documents D1 and D2).

3 **Re Item VIII**

Certain observations on the international application

3.1 ***Clarity (Art. 6 PCT)***

The application does not meet the requirements of Article 6 PCT, because claims 1-7 are not clear.

3.1.1 **Claim 1** is not supported by the description as required by Article 6 PCT, as its scope is broader than justified by the description.

The present claim 1 relates to a large number of possible methods as any method to make an aluminosilicate SSZ-98 zeolite is envisaged as long as it is made from the source materials of point a) which recites, amongst others, a source of silicon oxide and a source of aluminum oxide.

Support and disclosure within the meaning of Articles 5 and 6 PCT are to be found, however, for only a very small portion of the methods claimed i.e. a method, as claimed in claim 1, to make an aluminosilicate SSZ-98 starting from a Y-zeolite as source for Si and Al (i.e. CBV760 Y, CBV720 Y or CBV780 Y) as stated in all examples 1-10 of the description.

It has only been demonstrated that an aluminosilicate SSZ-98 using trimethylphenylammonium cations or cationic 1,4-diazabicyclo[2.2.2]octane as structure directing agent can be made using the process of claim 1 when starting from a Y-zeolite as the source for Al and Si. As the synthesis of zeolitic materials is a very unpredictable science, i.e. what works for one type of material might not work for another type, it is highly unlikely that the same process will work for merely any source of silicon oxide and/or source of aluminum oxide.

Claim 1 is not regarded as supported by the description as the skilled person would not be able, on the basis of the information as filed, to extend the particular teaching of the examples to the whole of the content of claim 1, by using routine experimentation (Article 6 PCT).

The same is valid for **claims 2-7** as they are dependent on or related to claim 1.

This problem can also be considered as an objection of lack of disclosure of the invention under Article 5 PCT, in the sense that only specific ways of carrying out the invention are exemplified. The information given in the description is of such limited and conflicting nature (par.[019] and [020] state that suitable sources of silicon oxide include fumed silica, precipitated silicates, silica hydrogel, silicic acid, colloidal silica, tetra-alkyl orthosilicates, and silica hydroxides and suitable sources of aluminum oxide include hydrated alumina and water-soluble aluminum salts (e.g., aluminum nitrate) while all examples 1-10 use Y-zeolite as source for Si and Al (i.e. CBV760 Y, CBV720 Y or CBV780 Y)) that the skilled person doesn't have sufficient clear information to reduce in practice without undue burden, with a reasonable expectation of success, which features/solutions solve the problem and which do not.

- 3.1.2 The vague and imprecise statements in paragraphs [077]-[079] of the **description** imply that the subject-matter for which protection is sought may be different to that defined by the claims, thereby resulting in lack of clarity (Article 6 PCT) when used to interpret them.

3.1.3 At numerous places in the **description**, the applicant states that a cited reference is '*incorporated herein by reference*'. However, any patent specification should regarding the essential features of the invention, be self-contained, i.e. capable of being understood without reference to any other document. Hence, the trivial wording should be deleted.

3.2 ***Miscellaneous***

3.2.1 To meet the requirements of Rule 11.8 PCT, the applicant is invited to number the lines of each sheet of the description and claims in sets of five, the numbers appearing on the left side, to the right of the margin.

3.2.2 **Claim 3** comprises all the features of claim 2 and is therefore not appropriately formulated as a claim dependent on the latter (Rule 6.4 PCT).

3.2.3 **Claim 7** comprises all the features of claim 6 and is therefore not appropriately formulated as a claim dependent on the latter (Rule 6.4 PCT).