

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 171266WO02	FOR FURTHER ACTION		See Form PCT/IPEA/416
International application No. PCT/EP2018/078502	International filing date (<i>day/month/year</i>) 18.10.2018	Priority date (<i>day/month/year</i>) 25.10.2017	
International Patent Classification (IPC) or national classification and IPC INV. C08F20/56			
Applicant BASF SE			
1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36. 2. This REPORT consists of a total of <u>15</u> sheets, including this cover sheet. 3. This report is also accompanied by ANNEXES, comprising: a. ☐ (<i>sent to the applicant and to the International Bureau</i>) a total of sheets, as follows: ☐ sheets of the description, claims and/or drawings which have been amended and/or sheets containing rectifications authorized by this Authority, unless those sheets were superseded or cancelled, and any accompanying letters (see Rules 46.5, 66.8, 70.16, 91.2, and Section 607 of the Administrative Instructions). ☐ sheets containing rectifications, where the decision was made by this Authority not to take them into account because they were not authorized by or notified to this Authority at the time when this Authority began to draw up this report, and any accompanying letters (Rules 66.4bis, 70.2(e), 70.16 and 91.2). ☐ superseded sheets and any accompanying letters, where this Authority either considers that the superseding sheets contain an amendment that goes beyond the disclosure in the international application as filed, or the superseding sheets were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in item 4 of Box No. I and the Supplemental Box (see Rule 70.16(b)). b. ☐ (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing, in the form of an Annex C/ST.25 text file, as indicated in the Supplemental Box Relating to Sequence Listing (see paragraph 3ter of Annex C of the Administrative Instructions).			
4. This report contains indications relating to the following items: ☒ Box No. I Basis of the report ☐ 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 Article 35(2) with regard to novelty, inventive step or 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			
Date of submission of the demand 10.01.2019		Date of completion of this report 31.10.2019	
Name and mailing address of the international preliminary examining authority:  European Patent Office P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Fax: +31 70 340 - 3016		Authorized officer Kaumann, Edgar Telephone No. +31 70 340-3640 	

Box No. I Basis of the report

1. With regard to the **language**, this report is based on
- ☒ 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 (under Rules 12.3(a) and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4(a))
 - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a) and (b))
2. With regard to the **elements*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

Description, Pages

1-89 as originally filed

Claims, Numbers

1-51 as originally filed

Drawings, Sheets

1/16-16/16 as originally filed

- ☐ a sequence listing - see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since either they are considered to go beyond the disclosure as filed, or they were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in the Supplemental Box (Rules 70.2(c) and (c-bis)):
- ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
5. ☐ This report has been established:
- ☐ taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rules 66.1(d-bis) and 70.2(e)).
 - ☐ without taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91(Rules 66.4bis and 70.2(e)).

6. ☒ With regard to top-up searches (Rules 66.1 *ter* and 70.2(f)):
- ☒ A top-up search was carried out by this Authority on 02.05.2019 (all discovered documents are listed in the Supplemental Box Relating to Top-up Search).
 - ☐ Additional relevant documents have been discovered during the top-up search.
 - ☐ No top-up search was carried out by this Authority because it would serve no useful purpose.
7. ☐ Supplementary international search report(s) from Authority(ies) has/have been received and taken into account in establishing this report (Rule 45bis.8(b) and (c)).

* If item 4 applies, some or all of those sheets may be marked "superseded".

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>1-51</u>
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	<u>1-51</u>
Industrial applicability (IA)	Yes: Claims	<u>1-51</u>
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rule 70.10)
and / or

2. Non-written disclosures (Rule 70.9)

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

1. Subject-matter

Subject-matter of **independent claims 1 and 33** is a process for producing an aqueous polyacrylamide solution by polymerizing an aqueous solution comprising at least acrylamide thereby obtaining an aqueous polyacrylamide gel and dissolving said aqueous polyacrylamide gel in water.

Subject-matter of **claim 37** is a process for producing an aqueous polyacrylamide gel by polymerizing an aqueous solution comprising at least acrylamide.

Subject-matter of **claim 39** is a process for producing an aqueous polyacrylamide solution by dissolving an aqueous polyacrylamide gel in water.

Subject-matter of **claim 42** is a modular, relocatable plant for manufacturing aqueous polyacrylamide solutions by polymerizing an aqueous solution comprising at least acrylamide thereby obtaining an aqueous polyacrylamide gel and dissolving said aqueous polyacrylamide gel in an aqueous liquid.

Subject-matter of **claim 46** is a modular, relocatable plant for manufacturing aqueous polyacrylamide gels by polymerizing an aqueous solution comprising at least acrylamide.

Subject-matter of **claim 47** is a modular, relocatable plant for manufacturing aqueous polyacrylamide solutions by dissolving an aqueous polyacrylamide gel in water.

Subject-matter of **claim 48** is the use of aqueous polyacrylamide solutions for mining applications, oilfield applications, water treatment, waste water cleanup, paper making or agricultural applications, wherein the aqueous polyacrylamide solution is prepared according to the process according to any of claims 1 to 36 and 39 to 41.

Subject-matter of **claim 49** is the use of aqueous polyacrylamide solutions for producing mineral oil from underground mineral oil deposits by injecting an aqueous fluid comprising at least an aqueous polyacrylamide solution into a mineral oil deposit through at least one injection well and withdrawing crude oil from the deposit through at least one production well, wherein the aqueous polyacrylamide solution is prepared according to the process according to any of claims 1 to 36 and 39 to 41.

Subject-matter of **claim 50** is the use of aqueous polyacrylamide solutions for fracturing subterranean formations by injecting an aqueous fracturing fluid comprising at least water, proppants and a fraction reducer through a wellbore into a subterranean formation at a pressure sufficient to flow into the formation and to initiate or extend fractures in the formation, wherein the fraction reducer comprises an aqueous polyacrylamide solution prepared by the process according to any of claims 1 to 36 and 39 to 41.

Subject-matter of **claim 51** is the use of aqueous polyacrylamide solutions for mining, mineral processing and/or metallurgy comprising the use for solid liquid separation, for tailings disposal, for polymer modified tailings deposition, for tailings management, as density and/or rheology modifier, as agglomeration aid, as binder and/or for material handling, wherein the aqueous polyacrylamide solution is prepared according to the process according to any of claims 1 to 36 and 39 to 41.

2. Prior Art

Reference is made to the following documents, all cited in the application:

D1: WO 2017/167803
D2: WO 2016/050819
D3: WO 2016/050817
D4: US 4,605,689
D5: WO 2016/131941
D6: WO 2016/131940
D7: WO 2015/158517
D8: WO 2017/186698
D9: WO 2017/186697
D10: WO 2017/186685

3. Article 33(2) PCT (Novelty)

D1 discloses a method for producing a polyacrylamide solution ..., comprising the following steps:

- (a) preparing an aqueous acrylamide solution by converting acrylonitrile to acrylamide using a biocatalyst,
- (b) separating the biocatalyst from the aqueous acrylamide solution of step (a)...
- (c) polymerizing the aqueous acrylamide solution obtained in step (b) to polyacrylamide.

Claim 18 specifies that the biocatalyst is *Rhodococcus rhodochrous*.

The paragraph bridging pages 6 and 7 discloses that ...an acrylamide solution with a low residual amount of biocatalyst results in a polyacrylamide solution having an increased viscosity. ...There is a demand for...a polyacrylamide solution having increased viscosity, because the application of polyacrylamide solutions in tertiary oil recovery specially counts on polymer solutions having high viscosity values accompanied by a reduced solubility, which is important in order to enhance the extraction outcome of the reservoir's oil from deeper rock layers.

The subject-matter of the present claims is distinguished from **D1** by the transportable polymerization unit as part of a modular relocatable plant and the modular relocatable plant.

D2 discloses a method for preparing an aqueous acrylamide solution, said method comprising the following steps:

- (a) contacting a biocatalyst capable of converting acrylonitrile to acrylamide with urea;
- (b) combining the following components (i) to (iii) in a reactor to obtain a composition for bioconversion:
 - (i) the biocatalyst obtained in step (a);
 - (ii) acrylonitrile;
 - (iii) water; and
- (c) performing a bioconversion on the composition obtained in step (b).

Claim 2 discloses a method for reducing the acrylic acid concentration of an aqueous acrylamide solution, wherein said aqueous acrylamide solution is prepared by a biocatalytic process described in claim 1.

Claim 15 specifies that the biocatalyst is *Rhodococcus rhodochrous*.

Page 22, line 21 to line 26 specify that acrylamide polymers are...used in oilfield applications. In particular, use of acrylamide polymers is made in tertiary oil recovery, which is also denoted as enhanced oil recovery. With this respect, in methods of tertiary oil recovery an aqueous solution of the polymer may be injected into the rock in order to promote oil displacement and thus increase the yield of crude oil.

The subject-matter of the present claims is distinguished from **D2** by the transportable polymerization unit as part of a modular relocatable plant and the modular relocatable plant.

D3 discloses a method for producing acrylamide from acrylonitrile in an aqueous solution in a reaction vessel, comprising contacting acrylonitrile with a Nitrile hydratase (NHase) producing microorganism in the presence of a saccharide.

Claim 6 discloses an aqueous acrylamide solution obtained or obtainable by the method of claims 1 to 4.

Claim 8 discloses polyacrylamide obtained by polymerizing the acrylamide solution of claim 6 or 7.

Page 16 lines 28 to 32 disclose that in a preferred embodiment, the biocatalyst belongs to the species *Rhodococcus rhodochrous*.

Page 19, line 33 to page 20, line 3 discloses that acrylamide polymers are used in oilfield applications. In particular, use of acrylamide polymers is made in tertiary oil recovery, which is also denoted as enhanced oil recovery. ...In methods of tertiary oil recovery an aqueous solution of the polymer may be injected into the rock in order to promote oil displacement and thus increase the yield of crude oil.

The subject-matter of the present claims is distinguished from **D3** by the transportable polymerization unit as part of a modular relocatable plant and the modular relocatable plant.

D4 discloses a process for producing a dilute polyacrylamide solution comprising:

- (a) providing a polyacrylamide gel of from 6 to 15% polymer solids;
- (b) conveying the polyacrylamide gel and a minor amount of aqueous media through a cutting device to provide a substantially non-degraded, concentrated aqueous slurry of finely divided gel particles;
- (c) dissolving and homogenizing said concentrated gel slurry in said aqueous media to provide a homogeneous solution concentrate; and (
- d) thereafter, diluting said solution concentrate with aqueous media until a dilute polyacrylamide solution of desired polymer solids content is obtained.

The purpose of the teaching of US 4,605,689, was to provide a process and apparatus for converting polyacrylamide gels into water-soluble polymer injection drive fluids for enhanced oil recovery which can be employed at the drilling site,...to provide a process for continuously producing solutions of polyacrylamide gel ...for use as injection drive fluids in enhanced oil recovery, and also flocculants in water treatment and mining operations, and as paper retention aids in paper making,...and to provide a process and

apparatus for producing on-site oil well injection drive fluids with solution viscosities particularly designed for use in the sand or rock formations of the oil well site (col. 2, lines 21 to 48).

The subject-matter of the present claims is distinguished from **D4** by:

- the biocatalytic step to convert acrylonitrile into acrylamide,
- the transportable polymerization unit as part of a modular relocatable plant and the modular relocatable plant.

D5 discloses a process for producing a composition comprising at least one water-soluble polyacrylamide and at least one stabilizer, comprising:

- a) providing an aqueous monomer solution comprising 20% to 45% by weight of ethylenically unsaturated monomers, at least one being (meth)acrylamide, an initiator for the free-radical polymerization, and an aqueous solvent;
- b) polymerizing the aqueous monomer solution to obtain the polyacrylamide in the form of a polymer gel;
- c) treating the polymer gel with an aqueous solution comprising a stabilizer selected from sulfur compounds, N-oxides, organic nitroso compounds, aromatic hydroxyl compounds and ketones;
- d) optionally drying the polymer gel from step c.

Page 21, lines 19 to 22 discloses that preferably, the polymerization in step b) is conducted under adiabatic conditions, wherein the monomer solution is heated under the influence of the heat of polymerization formed and a polymer gel is obtained.

The subject-matter of the present claims is distinguished from **D5** by:

- the biocatalytic step to convert acrylonitrile into acrylamide,
- the transportable polymerization unit as part of a modular relocatable plant and the modular relocatable plant,
- the use of the polyacrylamide gel in oil field applications.

D6 discloses a process for producing a composition comprising water-soluble polyacrylamide and at least one stabilizer for prevention of polymer degradation by molecular oxygen, comprising the following steps:

- a) providing an aqueous monomer solution comprising 20% to 45% by weight, of at least one ethylenically unsaturated monomer, at least one being (meth)acrylamide, an initiator for the free-radical polymerization and an aqueous solvent,

- b) polymerizing the aqueous monomer solution to obtain the acrylamide in the form of a polymer gel;
- c) treating the polymer gel with an aqueous solution comprising a stabilizer;
- d) optionally drying the polymer gel from step c).

Page 20, lines 39 to 41 discloses that preferably, the polymerization in step b) is conducted under adiabatic conditions, wherein the monomer solution is heated under the influence of the heat of polymerization formed and a polymer gel is obtained.

The subject-matter of the present claims is distinguished from **D6** by:

- the biocatalytic step to convert acrylonitrile into acrylamide,
- the transportable polymerization unit as part of a modular relocatable plant and the modular relocatable plant,
- the use of the polyacrylamide gel in oil field applications.

D7 discloses a process for preparing water-soluble polymers comprising (meth)acrylamide by free-radical polymerization of an aqueous solution of ethylenically unsaturated monomers comprising (meth)acrylamide in the presence of at least one stabilizer,

wherein the polymerization is a gel polymerization, and wherein the process comprises at least the following steps:

(I) providing an aqueous monomer solution comprising water,

(A) 25 to 45% by weight of ethylenically unsaturated monomers, where at least 70% by weight are hydrophilic monomers (A1), one being (meth)acrylamide,

(B) 0.1 to 2% by weight of at least one stabilizer for prevention of polymer degradation by molecular oxygen, the stabilizer being selected from sulfur compounds, sterically hindered amines, N-oxides, nitroso compounds, aromatic hydroxyl compounds and ketones,

(C) an azo initiator having a half-life of 10 h at 40°C to 75°C,

where the aqueous monomer solution has a pH of <7, is at a temperature of < 5°C, and has been inertized,

(II) adding

(D) at least one redox initiator to the aqueous monomer solution at a temperature of less than 5°C,

(III) polymerizing the aqueous monomer solution under adiabatic conditions, the initiation temperature of the being less than 5°C, to provide a reaction mixture that is heated with the heat of polymerization to a temperature of 60°C to 100°C, to provide a polymer gel, and

(IV) drying the polymer gel.

Claim 10 specifies that the polymerization is conducted in a conical reactor.

Claim 11 specifies that the conical reactor is a tubular reactor (1) which has a diameter D1 and narrows conically (2) at the lower end, where the diameter at the end of the conical narrowing is D2, the ratio D1/D2 is 2:1 to 25:1.

The subject-matter of the present claims is distinguished from **D7** by:

- the biocatalytic step to convert acrylonitrile into acrylamide,
- the transportable polymerization unit as part of a modular relocatable plant and the modular relocatable plant,
- the use of the polyacrylamide gel in oil field applications.

4. Article 33(3) PCT (Inventive Step)

The present application does not satisfy the criterion set forth in Article 33(3) PCT because the subject-matter of the present claims lacks an inventive step in respect of the prior art as defined in the regulations (Rule 64(1)-(3) PCT).

D1 is regarded as the closest prior art for the subject-matter of the present claims. application.

The only difference between the teaching of D1 and the teaching of the present claims is, that the polymerization unit is transportable and is part of a modular, relocatable plant.

The technical effect resulting from this feature is that the polymerization of the acrylamide can be performed at different locations, where it is needed.

Therefore, the objective technical problem has to be formulated as how to provide a process for the polymerization of acrylamide at different locations.

From the cited prior art, it can be seen that all technical features as such are known in the art. Therefore, the development of a transportable polymerization unit as part of a modular, relocatable plant would have been a straightforward option for the skilled person, which he would select, in accordance with circumstances, without the exercise of inventive skill, in order to solve the problem posed.

Therefore, an inventive step cannot be acknowledged to the subject-matter of the present claims.

5. Article 33(4) PCT (Industrial Applicability)

Since polyacrylamide solutions for oil field applications are important industrial products, industrial applicability can be acknowledged.

Re Item VI

Certain documents cited

Application No Patent No	Publication date (day/month/ year)	Filing date (day/month/year)	Priority date (<i>valid claim</i>) (day/month/year)
WO 2017186698	02.11.2017	25.04.2017	26.04.2016
WO 2017186697	02.11.2017	25.04.2017	26.04.2016
WO2017186685	02.11.2017	25.04.2017	26.04.2016

D8 discloses a method for preparing an aqueous polyacrylamide solution, comprising: hydrating acrylonitrile in water in presence of a biocatalyst capable of converting acrylonitrile to acrylamide so as to obtain an acrylamide solution, directly polymerizing the acrylamide solution so as to obtain a polyacrylamide gel, and directly dissolving the polyacrylamide gel by addition of water so as to obtain an aqueous polyacrylamide solution, wherein the polyacrylamide gel is dissolved by means of water jet cutting.

Preferred biocatalysts are disclosed on page 9.

Claim 17 specifies that the method is carried out at an oilfield or at a mining area.

Claim 18 specifies that the method is carried out in at least one mobile reactor.

Claim 20 discloses the use of an aqueous polyacrylamide solutions for producing mineral oil from underground mineral oil deposits by injecting an aqueous fluid comprising at least an aqueous polyacrylamide solution into a mineral oil deposit through at least one injection well and withdrawing crude oil from the deposit through at least one production well, wherein the aqueous polyacrylamide solution is prepared on the oilfield using a method according to any of claims 1 to 19.

Claim 21 discloses the use of an aqueous polyacrylamide solutions for mining, mineral processing and/or metallurgy comprising the use for solid liquid separation, for tailings disposal, for polymer modified tailings deposition, for tailings management, as density and/or rheology modifier, as agglomeration aid, as binder and/or for material handling, wherein the aqueous polyacrylamide solution is prepared in a mining area using a method according to any of claims 1 to 19.

Page 20, lines 16 to 19 discloses that the method may be carried out in at least one mobile reactor. Thus, the polyacrylamide solution may be produced exactly with quantities as demanded. Further, the aqueous polyacrylamide solution may be transferred after being dissolved to the position on site, where it is to be used.

Page 5, lines 38 to page 6 line 4 discloses that preferably, the aqueous solution may be mixed with one or more monoethylenically unsaturated, water-soluble comonomers, thereby obtaining copolymers comprising acryl amide and one or more comonomers for example acrylic acid and/or 2-acrylamido-2-methylpropane sulfonic acid or salts thereof.

As the aqueous solution comprising acryl amide is directly polymerized so as to obtain a polyacrylamide gel, significant costs for transport of aqueous solutions of acryl amide to remote locations may be saved.

Page 17, lines 21 to 25 discloses that the conversion of acrylonitrile to acrylamide ... is an adiabatic process, wherein the temperature raises up to 100 °C.

Page 28, lines 26 to 32 discloses that the method may be monitored on line. Further, may be carried out on site. Thus, the installation may be disposed at a site where the polyacrylamide solution is actually used, for example at an oilfield or at a mining area. The at least one reactor may be mobile. For example, the above described first and second reactors may be mobile and disposed on a vehicle.

Page 39 lines 28 to 30 disclose that the aqueous injection fluid may optionally comprise further components, for example biocides, stabilizers, free-radical scavengers, initiators, surfactants, cosolvents, bases and complexing agents.

Therefore, the subject-matter of present claims 1 - 41 and 48 - 51 lacks novelty in view of **D8**.

D9 discloses a method for preparing an aqueous polyacrylamide solution, comprising:

- hydrating acrylonitrile in water in presence of a biocatalyst capable of converting acrylonitrile to acrylamide so as to obtain an acrylamide solution,
- directly polymerizing the acrylamide solution so as to obtain a polyacrylamide gel, and
- directly dissolving the polyacrylamide gel by addition of water so as to obtain an aqueous polyacrylamide solution.

method is carried out on site.

Preferred biocatalysts are disclosed on page 9.

Claim 17 specifies that the method is carried out at an oilfield or at a mining area.

Claim 18 specifies that the method is carried out in at least one mobile reactor.

Claim 20 discloses the use of aqueous polyacrylamide solutions for producing mineral oil from underground mineral oil deposits by injecting an aqueous fluid comprising at least an aqueous polyacrylamide solution into a mineral oil deposit through at least one injection well and withdrawing crude oil from the deposit through at least one production well, wherein the aqueous polyacrylamide solution is prepared on the oilfield using a method according to any of claims 1 to 19.

Claim 21 discloses the use of aqueous polyacrylamide solutions for mining, mineral processing and/or metallurgy comprising the use for solid liquid separation, for tailings disposal, for polymer modified tailings deposition, for tailings management, as density and/or rheology modifier, as agglomeration aid, as binder and/or for material handling, wherein the aqueous polyacrylamide solution is prepared in a mining area using a method according to any of claims 1 to 19.

Page 5, lines 34 to 36 discloses that the aqueous solution comprising acryl amide is directly polymerized so as to obtain a polyacrylamide gel, significant costs for transport of aqueous solutions of acryl amide to remote locations may be saved.

Page 17, lines 16 to 20 discloses that the conversion of acrylonitrile to acrylamide ... is an adiabatic process, wherein the temperature raises up to 100 °C.

Page 24, lines 35 to 40 discloses that the method may be monitored on line. Further, may be carried out on site. Thus, the installation may be disposed at a site where the polyacrylamide solution is actually used, for example at an oilfield or at a mining area. The at least one reactor may be mobile. For example, the above described first and second reactors may be mobile and disposed on a vehicle.

Page 35, lines 30 to 32 discloses that the aqueous injection fluid may optionally comprise further components for example biocides, stabilizers, free-radical scavengers, initiators, surfactants, cosolvents, bases and complexing agents.

Therefore, the subject-matter of the present claims lacks novelty in view of **D9**.

D10 discloses a method for preparing an aqueous polyacrylamide solution, comprising:

- hydrating acrylonitrile in water in presence of a biocatalyst capable of converting acrylonitrile to acrylamide so as to obtain an acrylamide solution,
- directly polymerizing the acrylamide solution so as to obtain a polyacrylamide gel, and
- directly dissolving the polyacrylamide gel by addition of water so as to obtain an aqueous polyacrylamide solution, wherein the polyacrylamide gel is dissolved by means of an mixer comprising a rotatable impeller and a cylindrical array of radially oriented blade members circumferentially surrounding the impeller with radial discharge orifices between adjacent blades.

Claim 17 specifies that the method is carried out at an oilfield or at a mining area.

Claim 18 specifies that the method is carried out in at least one mobile reactor.

Claim 20 discloses the use of aqueous polyacrylamide solutions for producing mineral oil from underground mineral oil deposits by injecting an aqueous fluid comprising at least an aqueous polyacrylamide solution into a mineral oil deposit through at least one injection well and withdrawing crude oil from the deposit through at least one production well, wherein the aqueous polyacrylamide solution is prepared on the oilfield using a method according to any of claims 1 to 19.

Claim 21 discloses the use of aqueous polyacrylamide solutions for mining, mineral processing and/or metallurgy comprising the use for solid liquid separation, for tailings disposal, for polymer modified tailings deposition, for tailings management, as density and/or rheology modifier, as agglomeration aid, as binder and/or for material handling, wherein the aqueous polyacrylamide solution is prepared in a mining area using a method according to any of claims 1 to 19.

Page 5, line 44 to page 6, line 2 disclose that the aqueous solution comprising acrylamide is directly polymerized so as to obtain a polyacrylamide gel, significant costs for transport of aqueous solutions of acrylamide to remote locations may be saved.

Page 17, lines 6 to 10 discloses that the conversion of acrylonitrile to acrylamide ... is an adiabatic process, wherein the temperature raises up to 100 °C.

Page 24, lines 6 to 10 discloses that the method may be monitored on line. Further, may be carried out on site. Thus, the installation may be disposed at a site where the polyacrylamide solution is actually used, for example at an oilfield or at a mining area. The at least one reactor may be mobile. For example, the above described first and second reactors may be mobile and disposed on a vehicle.

Page 34, lines 40 to 42 discloses that the aqueous injection fluid may optionally comprise further components for example biocides, stabilizers, free-radical scavengers, initiators, surfactants, cosolvents, bases and complexing agents.

Therefore, the subject-matter of the present claims lacks novelty in view of **D10**.

Re Item VIII

Certain observations on the international application

The present claims do not meet the requirements of Article 6 PCT because they only define the subject-matter in terms of the result to be achieved, which merely amounts to a statement of the underlying problem. All technical features necessary for achieving this result are common and obvious as such.

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(PCT Rule 71.1)

To:

BASF IP Association
BASF SE
G-FLP-C006
67056 Ludwigshafen
ALLEMAGNE

Date of mailing
(day/month/year)

31.10.2019

Applicant's or agent's file reference
171266WO02

IMPORTANT NOTIFICATION

International application No.
PCT/EP2018/078502

International filing date (day/month/year)
18.10.2018

Priority date (day/month/year)
25.10.2017

Applicant
BASF SE

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary report on patentability and its annexes, if any, established on the international application.
2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.
3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. REMINDER

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

Name and mailing address of the international
preliminary examining authority:



European Patent Office P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk - Pays Bas
Tel. +31 70 340 - 2040
Fax: +31 70 340 - 3016

Authorized Officer

Dekker, Monique

Tel. +31 70 340-4046

