

**PATENT COOPERATION TREATY**

From the  
INTERNATIONAL SEARCHING AUTHORITY

**PCT**

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:  
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Date of mailing  
(day/month/year) 19-02-2018

Applicant's or agent's file reference RKD2124-RIL		<b>FOR FURTHER ACTION</b> See paragraph 2 below
International application No. PCT/IB2017/057674	International filing date (day/month/year) 06-12-2017	Priority date (day/month/year) 09-12-2016
International Patent Classification (IPC) or both national classification and IPC B01J31/40 Version=2018.01		
Applicant RELIANCE INDUSTRIES LIMITED		

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 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/ Indian Patent Office Plot No. 32, Sector 14, Dwarka, New Delhi-110075 Facsimile No.	Date of completion of this opinion 19-02-2018	Authorized officer Dr. Suman Verma Telephone No. +91-1125300200
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Box No. I Basis of this 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 43*bis*.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 13*ter*.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 13*ter*.1(a)).
    - on paper or in the form of an image file (Rule 13*ter*.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:

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**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**

1. Statement

Novelty (N)	Claims	2-10	YES
	Claims	1	NO
Inventive step (IS)	Claims	2-10	YES
	Claims	1	NO
Industrial applicability (IA)	Claims	1-10	YES
	Claims	NONE	NO

2. Citations and explanations:

Reference is made to the following documents:

- D1: WO 2016005847 A1 (RELIANCE INDUSTRIES LIMITED), 14 JANUARY 2016 (14.01.2016).  
 D2: US 20100160145 A1 (CHEVRON CORPORATION), 24 JUNE 2010 (24.06.2010).  
 D3: US 2011215052 A1 (GUZMAN LUCERO DIEGO JAVIER [MX] ET AL), 08 SEPTEMBER 2011 (08/09/2011).

The present application relates to a process for treatment a spent ionic liquids, wherein said spent ionic liquid is halometallic based ionic liquid; said process comprising the following steps: a. mixing said spent ionic liquid with a first fluid medium and water to obtain slurry comprising a solid fraction and a liquid fraction; b. separating said solid fraction from said slurry by filtration to obtain a filtrate and a residue comprising hydrated ionic solids; c. drying said residue comprising said hydrated ionic solids at a temperature in the range of 60°C to 120°C to obtain treated ionic solids; and d. evaporating said filtrate to recover said first fluid medium.

Document D1 discloses regeneration process of deactivated ionic liquids comprising reacting deactivated ionic liquid with tetraethoxysilane, in the presence of a first solvent and water and a pH adjusting agent, to obtain a bi-phasic mixture; separating gel phase from said bi-phasic mixture to yield solvent phase comprising said cationic component and said deactivating agent(s); extracting said deactivating agent(s) from said solvent phase by using a second solvent to obtain a cationic component devoid of said deactivating agent(s); and recovering said cationic component (see examples, claims).

D2 discloses a process for preparing a salt of an ionic liquid based on a chloroaluminate comprising mixing an ionic liquid based on a chloroaluminate with a secondary alcohol and forming an aluminum chloride adduct precipitate, removing the precipitate; and removing the secondary alcohol to thereby leave a salt of the

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**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:

Present application states the technical advances and economical significance on page 10-11 of description, but in absence of supported data the same is not credible; does not fulfill the requirement of PCT Article 6.

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

Continuation of Citation and Explanation(Box5)

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ionic liquid(see abstract, claim 1).

D3 discloses a process for recovering ionic liquids comprising the steps of: providing a first ionic liquid mixture, the first ionic liquid having a halogen metallate anion, the mixture containing an organic solvent, acetone; adjusting the pH of the mixture to pH 7-10 by the addition of a base (sodium hydroxide) to form a precipitate; separating the first precipitate from the mixture (see paragraphs [0027]-[0028]; Examples).

Novelty under PCT Article 33(2):

D1 discloses the process for regeneration of deactivated ionic liquids by preparing a biphasic slurry using first fluid medium and water, and separating/extracting and recovering the cationic component devoid of deactivating agents from said biphasic slurry. Thus D1 discloses the process as claimed in present claim 1, hence claim 1 lacks novelty over D1 under PCT Article 33(2).

The present process as claimed in dependent claims 2-10 is differs from the D1 in terms of use of first fluid which are selected from primary secondary aldehydes, ketones, esters, in combination with water, and further cited prior art does not teaches or suggest the ratio of the first fluid medium to the spent ionic liquid or to water, and further step of contacting said treated ionic solids with at least one second fluid medium selected from water. dichloromethane, acetonitrile, alcohol, ketone, aldehyde, and ether to separate an active ionic liquid.

Therefore the subject matter of present claims 2-10 is considered novel over D1 under PCT Article 33(2).

Documents D2-D3 do not disclose all the features of present claimed process alone, hence claims 1-10 are considered to be novel under PCT Article 33(2).

Inventive step under PCT Article 33(3):

Since claim 1 is not novel over disclosure of D1, hence it also considered to lack inventive step under PCT Article 33(3).

Regarding claims 2-10, the present process differs from the documents D1-D3 in view of use of primary/secondary aldehydes, ketones, esters as first fluid medium with water, and further use of second fluid medium. Further cited prior art does not teaches or suggest the specific ratio of the first fluid medium to the spent ionic liquid or to water.

Since none of the cited documents D1-D3 either alone or in combination teach or motivate a person skilled in the art to arrive at the presently claimed process in claim 2-10.

Thus the subject matter of claims 2-10 is considered to involve an inventive step under PCT Article 33(3).

Industrial applicability under PCT Article 33(4):

The subject-matter of claims 1-10 is industrially applicable under PCT Article 34(4).