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(54) Title: METHODS OF GENERATING AND TESTING AQUEOUS GAS STREAMS

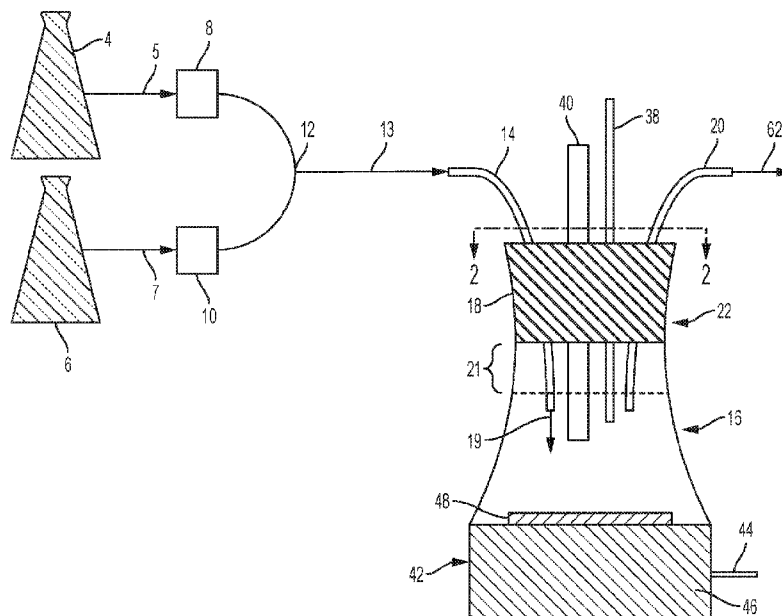


FIG. 1

(57) Abstract: A method for producing an aqueous gas stream within a self-pressurized flow cell (16) comprises mixing an aqueous salt precursor (7) and an aqueous acid precursor (5) at an inline mixing location (12) to produce a liquid precursor mixture (13) that is introduced through an inlet tube (14) to the self-pressurized flow cell (16) to produce aqueous gases. Once in the self-pressurized flow cell (16), the precursor mixture (13) reacts with the sample (48). Both the sample (48) and the reacted aqueous solution (62) may be subjected to a variety of real-time tests, such as electrochemical tests and in line characterization techniques. This method allows for the concentrations of the aqueous salt precursor (7) and the aqueous acid precursor (5) to be accurately and precisely maintained while allowing for increased safety when handling and testing the various toxic aqueous gas streams produced.



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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2019/042548

A. CLASSIFICATION OF SUBJECT MATTER INV. G01N17/02 ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols) G01N		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) EPO-Internal		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2014/220699 A1 (PUDIL BRYANT J [US] ET AL) 7 August 2014 (2014-08-07)	1,12,13,15
Y	paragraph [0259]; figure 2 -----	2,3,14
Y	GB 2 159 507 A (MITSUBISHI HEAVY IND LTD) 4 December 1985 (1985-12-04) page 2, line 18 - page 3, line 46; figure 1 -----	2,3,14
X	JP 2009 056418 A (CENTRAL RES INST ELECT) 19 March 2009 (2009-03-19)	1-4,8-11
Y	paragraphs [0030] - [0055]; figure 2 -----	5-7
Y	US 2011/066388 A1 (SNELLING RICKY EUGENE [US] ET AL) 17 March 2011 (2011-03-17) abstract; figure 1 -----	5-7
☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents :		
"A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family	
Date of the actual completion of the international search 17 January 2020	Date of mailing of the international search report 29/01/2020	
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Wilhelm-Shalghanov, J	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2019/042548

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 2, 3, 12-15(completely); 1(partially)

Real-time testing of aqueous gas solution

1.1. claims: 12, 13(completely); 1(partially)

Acids

1.2. claims: 14, 15(completely); 1(partially)

Salts

2. claims: 4-11(completely); 1(partially)

Reaction with sample

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2019/042548

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