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Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

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28 February 2013

(54) Title: CHLORINE DIOXIDE PRECURSOR AND METHODS OF USING SAME

(57) Abstract: According to one aspect of the invention, a method of converting an oxy halide salt into a halide dioxide in a reaction zone under certain conditions is provided. More specifically, the method includes generating chlorine dioxide from a stable composition comprising an oxy halide salt by introducing said composition to a reducing agent and minimum temperature within the reaction zone. According to another aspect of the invention, a composition for a stable chlorine dioxide precursor comprising an oxy halide salt is provided.



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A. CLASSIFICATION OF SUBJECT MATTER*C01B 11/02(2006.01)i, C01B 31/24(2006.01)i, C07B 41/00(2006.01)i, C07B 61/00(2006.01)i*

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)

C01B 11/02; C11D 3/39; E21B 43/00; B08B 9/00; B01J 19/00; C23F 14/02

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: chlorine dioxide, chlorate, acid, reducing agent, geological material, petroleum, deposit, microbe, minimum temperature

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A	US 2003-0203827 A1 (ANDREW J. COOPER et al.) 30 October 2003 See abstract; paragraphs [0037]-[0048], [0054]-[0055]; claims 1-2, 9, 14	1-4,6-12,14-17 ,19-20,36-37,39-44 ,47-48,50-51 5,13,21-35,38 ,45-46,49
X A	US 2007-0116637 A1 (THOMAS WOODRUFF et al.) 24 May 2007 See abstract; claim 1	1,9,11-12,15,36-37 ,47-48,50-51 2-8,10,13-14,16-17 ,19-35,38-46,49
A	US 2007-0295936 A1 (JOHN BYRNE et al.) 27 December 2007 See abstract; claims 1, 24	1-17,19-51
A	US 2004-0224855 A1 (ZHANYUAN HAO et al.) 11 November 2004 See abstract; claim 1	1-17,19-51



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 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

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Name and mailing address of the ISA/KR

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2012/030149**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.: 18
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 the supplemental box.

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 fee, this Authority did not invite payment of any additional fee.
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.

Continuation of: (Box No. III.)

Claims 1; and 5-7, 9-20, 51(dependent on claim 1) are directed to a method for introducing an oxy halide salt into a zone.

Claims 2; and 5, 8-9, 11-13, 15-20, 51(dependent on claim 2) are directed to a method for reducing, inactivating, destroying, or eliminating one or more reduced sulfur compounds.

Claims 3; and 5-7, 9-13, 15-20, 51(dependent on claim 3) are directed to a method for oxidizing one or more polymers, reduced sulfur compounds, or reduced metals.

Claims 4; and 5, 8-9, 11-13, 15-20, 51(dependent on claim 4) are directed to a method for inactivating, destroying or killing one or more microbes.

Claims 21-35 are directed to a composition comprising an oxy halide salt and an acid.

Claims 36-51 are directed to a method of generating chlorine dioxide.

Since the above mentioned groups of claims do not share any of the technical features identified, a technically special relationship between the inventions of said claims does not exist. Accordingly, the claims do not relate to one invention or to a single inventive concept, a priori.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/US2012/030149

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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