



US009409119B2

(12) **United States Patent**  
**Murai et al.**

(10) **Patent No.:** **US 9,409,119 B2**

(45) **Date of Patent:** **Aug. 9, 2016**

(54) **ACID GAS ABSORBENT, ACID GAS  
REMOVAL METHOD, AND ACID GAS  
REMOVAL DEVICE**

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(\* ) Notice: Subject to any disclaimer, the term of this  
patent is extended or adjusted under 35  
U.S.C. 154(b) by 384 days.

(21) Appl. No.: **13/332,018**

(22) Filed: **Dec. 20, 2011**

(65) **Prior Publication Data**

US 2012/0161071 A1 Jun. 28, 2012

(30) **Foreign Application Priority Data**

Dec. 22, 2010 (JP) ..... P2010-286554  
Nov. 11, 2011 (JP) ..... P2011-247775  
Nov. 11, 2011 (JP) ..... P2011-247776

(51) **Int. Cl.**  
**C09K 3/00** (2006.01)  
**B01D 53/14** (2006.01)  
**C07C 215/08** (2006.01)

(52) **U.S. Cl.**  
CPC ..... **B01D 53/1493** (2013.01); **B01D 53/1475**  
(2013.01); **C07C 215/08** (2013.01);  
(Continued)

(58) **Field of Classification Search**  
CPC ..... B01D 53/1493; B01D 53/1475; B01D  
215/08; B01D 2252/20426; B01D  
2252/20431; B01D 2252/20442; B01D  
2252/20447; B01D 2252/504; B01D  
2252/602; Y02C 10/06  
USPC ..... 252/189, 190, 192  
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,101,633 A 7/1978 Sartori et al.  
4,112,052 A 9/1978 Sartori et al.

(Continued)

FOREIGN PATENT DOCUMENTS

CA 2 576 454 10/2006  
EP 0 647 462 A1 4/1995

(Continued)

OTHER PUBLICATIONS

STIC Search Report dated Jul. 25, 2014.\*

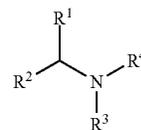
(Continued)

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(57) **ABSTRACT**

An acid gas absorbent of which recovery amount of acid gas  
such as carbon dioxide is high, and an acid gas removal device  
and an acid gas removal method using the acid gas absorbent  
are provided. The acid gas absorbent of the embodiment  
comprising at least one type of tertiary amine compound  
represented by the following general formula (1).



(In the above-stated formula (1), either one of the R<sup>1</sup>, R<sup>2</sup>  
represents a substituted or non-substituted alkyl group of  
which carbon number is 2 to 5, and the other one represents a  
substituted or non-substituted alkyl group of which carbon  
number is 1 to 5. The R<sup>3</sup> represents a methyl group or an ethyl  
group, and the R<sup>4</sup> represents a hydroxyalkyl group. The R<sup>1</sup>,  
R<sup>2</sup> may either be the same or different, and they may be  
coupled to form a cyclic structure.)

**20 Claims, 1 Drawing Sheet**

