

Accepted Manuscript

Title: Development of a Novel Volumetric Matrix Dump Combustor for VOC Reduction

Authors: Soo Hyuk Yoon, Young Nam Chun

PII: S0263-8762(17)30248-4

DOI: <http://dx.doi.org/doi:10.1016/j.cherd.2017.04.018>

Reference: CHERD 2655

To appear in:

Received date: 23-10-2016

Revised date: 1-4-2017

Accepted date: 18-4-2017

Please cite this article as: Yoon, Soo Hyuk, Chun, Young Nam, Development of a Novel Volumetric Matrix Dump Combustor for VOC Reduction. Chemical Engineering Research and Design <http://dx.doi.org/10.1016/j.cherd.2017.04.018>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Development of a Novel Volumetric Matrix Dump Combustor for VOC Reduction

Soo Hyuk Yoon, Young Nam Chun*

Department of Environmental Engineering, Chosun University, 375 Seosuk-dong, Dong-gu, Gwangju 501-759, Korea

* **Corresponding Author:** Young Nam Chun, Ph.D. (TEL:+82-62-230-7156, FAX:+82-62-230-7156, E-mail:ynchun@chosun.ac.kr)

Address: Department of Environmental Engineering, Chosun University, 375, Seosuk-dong, dong-gu, Gwangju, Rep. Korea. 501-729

Highlights

- A novel Volumetric Matrix Dump Combustor (VMDC) has been proposed to process such a low-calorie gas of VOC.
- The VMDC consists of a dump combustor, a volumetric matrix burner and a plasma burner.
- VOC decomposition performance was achieved to present ability for the newly proposed VMDC.

Abstract

VOCs(Volatile Organic Compounds) are produced mainly at work places or laundries using painting processes or organic solvents. These are composed of hydrocarbon of diversified forms and low calories due to the low concentration as they are released to atmosphere as to be diluted, making difficult direct burning by a conventional burner.

In the present study, a new form of VMDC (Volumetric Matrix Dump Combustor) has been proposed to process such a low-calorie gas of VOC. This combustor is configured in the form of combining characteristics of a plasma burner, a dump combustor and a volumetric matrix burner. Hence, the VMDC is configured as a structure capable of securing sufficient decomposition temperature and residence time required for stable flame formation and VOC decomposition.

To investigate performance and operation characteristics of the VMDC, experiments were conducted as parameters of gas feed rate, VOC concentration, VOC injection position, plasma input power, and heat recuperator by using toluene as a representative VOC.

With the plasma burner, shortening of ignition time upon initial starting, enhancement in flame stability and combustibility, and expansion of flammable range were enabled, while not only high-efficiency decomposition but also processing of large amounts of VOC was possible by formation of a recirculation region in the dump combustor, and low-temperature, super-adiabatic, complete combustion and decomposition of VOC was made possible by the volumetric matrix burner.

Download English Version:

<https://daneshyari.com/en/article/4987172>

Download Persian Version:

<https://daneshyari.com/article/4987172>

[Daneshyari.com](https://daneshyari.com)