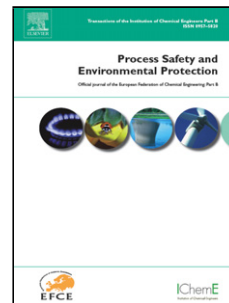


## Accepted Manuscript

Title: Modeling of gas adsorption by aerosol plumes emitted from industrial sources

Authors: Tov Elperin, Andrew Fominykh, Itzhak Katra, Boris Krasovitev



PII: S0957-5820(17)30240-9  
DOI: <http://dx.doi.org/doi:10.1016/j.psep.2017.06.022>  
Reference: PSEP 1128

To appear in: *Process Safety and Environment Protection*

Received date: 6-2-2017  
Revised date: 21-5-2017  
Accepted date: 7-6-2017

Please cite this article as: Elperin, Tov, Fominykh, Andrew, Katra, Itzhak, Krasovitev, Boris, Modeling of gas adsorption by aerosol plumes emitted from industrial sources. *Process Safety and Environment Protection* <http://dx.doi.org/10.1016/j.psep.2017.06.022>

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.

# Modeling of gas adsorption by aerosol plumes emitted from industrial sources

Tov Elperin<sup>1</sup>, Andrew Fominykh<sup>1</sup>, Itzhak Katra<sup>2</sup>, Boris Krasovitev<sup>1\*</sup>

<sup>1</sup>*Department of Mechanical Engineering, The Pearlstone Center for Aeronautical Engineering Studies, Ben-Gurion University of the Negev, P. O. B. 653, 8410501, Israel*

<sup>2</sup>*Department of Geography and Environmental Development, Ben-Gurion University of the Negev, P. O. B. 653, 8410501, Israel*

\* Corresponding author: Tel.: +972 8 6477067; fax: +972 8 6472813.

E-mail addresses: elperin@bgu.ac.il (T. Elperin), fominykh@bgu.ac.il (A. Fominykh), katra@bgu.ac.il (I. Katra), borisk@bgu.ac.il (B. Krasovitev).

## Highlights

- 2-D model of gas adsorption by aerosol particles in air pollution plume is developed.
- The obtained results are compared with the available experimental data.
- The adsorbate concentration is calculated for the particulate matter PM<sub>2.5-10</sub>.
- Spatial evolution of active gas concentration depends on stability of atmosphere.
- The vertical mean wind velocity profiles are fitted from the field measurements data.

## ABSTRACT

Adsorption of trace atmospheric gases by aerosol particles contributes to the evolution of concentration distribution of the trace constituents and can affect subsequent chemical reactions in the atmosphere. We suggest a two dimensional model of adsorption of trace atmospheric constituents by aerosol particles in air pollution plume emitted from an industrial source. The model is based on an application of theory of turbulent diffusion in the atmospheric boundary layer (ABL) in conjunction with plume dispersion model and model of gas adsorption by porous solid particles. The wind velocity profiles used in the simulations were fitted from our data previously obtained in field measurements conducted in the Northern Negev (Israel) using the experimental wind mast. The developed model allows analyzing spatial and temporal evolution of adsorbate concentration in the gaseous phase as well as in the particulate matter. The

Download English Version:

<https://daneshyari.com/en/article/4980671>

Download Persian Version:

<https://daneshyari.com/article/4980671>

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