Environmental Engineering and Management Journal

August 2019, Vol.18, No. 8, 1721-1726
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu

"Gheorghe Asachi" Technical University of Iasi, Romania

A NEW APPROACH TO OBTAIN AEROGELS FOR GAS SAFETY APPLICATIONS

Corneliu S. Stan[1], Gabriela Soreanu[2*], Marcel Popa[1], Petronela Horlescu[1], Tudor Lupascu[3], Igor Cretescu[2*]

[1]"Gheorghe Asachi" Technical University of Iasi, "Cristofor Simionescu" Faculty of Chemical Engineering and Environmental Protection, Department of Chemical Engineering, 73 D. Mangeron Blvd., Iasi 700050, Romania
[2]"Gheorghe Asachi" Technical University of Iasi, "Cristofor Simionescu" Faculty of Chemical Engineering and Environmental Protection, Department of Environmental Engineering and Management, 73 D. Mangeron Blvd., Iasi 700050
[3]Institute of Chemistry, Academy of Science of Moldova, 3 Academiei Street, MD-2028, Chişinău, Moldova

Abstract

In this study a new approach for aerogel preparation is presented, along with the screening of obtained aerogel towards air decontamination potential. The synthesis method allows the tuning of the porosity degree of the aerogel by changing the amount of the solvent (water), which dictates the physical appearance of the obtained aerogel (compacted or expanded). Experiments have been carried out under dynamic conditions, by using isobutylene (ISB) as model pollutant and activated carbon as a reference sorbent. At low contaminant loading, the obtained aerogels exhibit comparable performance with that observed for activated carbon, otherwise the activated carbon presents the highest performance at higher loadings. The physical appearance of the aerogel appears to influence the ISB removal performance. Influence of gas flowrate and ISB concentration on the performance response is depicted. The obtained results reveal new perspectives in developing and using aerogels (ultralight materials) for the removal of air contaminants in special applications such as those related to gas safety (for example, the gas masks that should assure not only quality, but also comfort).

Keywords: activated carbon, aerogel, air treatment, gas safety, isobutylene

Received: July, 2018; Revised final: March, 2019; Accepted: May, 2019; Published in final edited form: August, 2019

[*]Author to whom all correspondence should be addressed: e-mail: gsor@tuiasi.ro; icre@tuiasi.ro