Environmental Engineering and Management Journal *August 2021, Vol. 20, No. 8, 1341-1351*
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu

"Gheorghe Asachi" Technical University of Iasi, Romania

EFFECTIVE REMOVAL OF RHODAMINE B DYE FROM AQUEOUS SOLUTION BY ADSORPTION ON α -AG_2WO_4/SBA-15 NANOMATERIAL

Francisco das Chagas Marques da Silva[1*], Lara Kelly Ribeiro da Silva[1], Anne Gabriella Dias Santos[2], Vinicius Patrício Santos Caldeira[2], Laécio Santos Cavalcante[3], Germano Pereira dos Santos[1], Geraldo Eduardo da Luz Junior[1,3]

[1]Department of Chemistry, Federal University of Piaui, 64049-550, Teresina-PI, Brazil
[2]Department of Chemistry- FANAT State University of Rio Grande do Norte, Mossoró, RN 59610-210, Brazil
[3]GERATEC-CCN-DQ, State University of Piaui, João Cabral S/N, 64002-150, Teresina-PI, Brazil

Abstract

Silver tungstate (α-Ag_2WO_4), sieve molecular mesoporous (SBA-15), and α-Ag_2WO_4/SBA-15 x% (x is mass ratio of 5, 10, and 20% of α-Ag_2WO_4 to SBA-15) were synthetized by sonochemical, hydrothermal, and post-synthesis methods, respectively. The materials were characterized by powder X-ray diffractometry (XRD), field emission electron microscopy (SEM), N_2 adsorption/desorption, X-ray photoelectron spectroscopy (XPS), and zeta potential. The characterizations verify that silver tungstate (α-Ag_2WO_4) and nanocomposite α-Ag_2WO_4/SBA-15 x% were obtained. The performance of α-Ag_2WO_4/SBA-15 x% in adsorption of RhB depended on percentage of α-Ag_2WO_4. The RhB adsorption behavior onto adsorbents was well fitted to pseudo-second order kinetics and Langmuir isotherm model. The removal efficiency of α-Ag_2WO_4/SBA-15 20% (1.050 g L^{-1}) was 100% for RhB 50 ppm at 30 min. Moreover, 80% of RhB was recuperated from adsorbents at neutral pH.

Key words: adsorbent, molecular sieve, wastewater treatment

Received: September, 2020; Revised final: February, 2021; Accepted: March, 2021; Published in final edited form: September, 2021

[*] Author to whom all correspondence should be addressed: e-mail: fmarquesilva@hotmail.com; Phone: +55 86 8834-7156