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Reutilization of carbon from exhausted water filter cartridges (EWFC) for decontamination of water: An innovative waste management approach

Prachi P. Bote [a], Siddharth R. Vaze [a], Chandrashekhar S. Patil [c,e], Suryakant A. Patil [b], Govind B. Kolekar [c], Mahaveer D. Kurkuri [e], Anil H. Gore [a,d,*]

[a] Department of Chemistry, Rajarshi Chhatrapati Shahu College, Kolhapur, 416005, MS, India
[b] Department of Chemistry, Sanjay Ghodawat University, Atigre, Kolhapur, 416118, MS, India
[c] Fluorescence Spectroscopy Research Laboratory, Department of Chemistry, Shivaji University, Kolhapur, 416004, MS, India
[d] Tarsadia Institute of Chemical Science, Uka Tarsadia University, Bardoli, 394350, Gujarat, India
[e] Centre for Nano and Material Sciences, JAIN University, Jain Global Campus, Bengaluru, 562112, Karnataka, India

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ABSTRACT

Since from the last couple of decades, the waste and its management has became the most prominent problems that the world is facing serious issues nowadays. Most of the waste in the environment can be reutilized very easily via simple physical/chemical treatments. Under this, we have proposed a novel, simple, economical, sustainable, and renewable approach for cleaning polluted water by proper utilization of carbon from the exhausted water filter cartridges (EWFC). The activated carbon (AC) from the environmental EWFC was obtained through simple reactivation by a moderate physical treatment in the furnace (400°C; 1hr). The results from XRD,FE-SEM, BET, RAMAN, and TEM characterization bear out the successful generation of AC from EWFC (AC-EWFC). In the proposed work methylene blue (MB) dye was used as a model pollutant. To estimate the maximum adsorption capacity of AC-EWFC, a batch adsorption technique was implemented and it was found to be 55.62 $mg.g^{-1}$. The influence of various core parameters like solution pH, amount of AC-EWFC, MB dye concentration, and the interaction period was carried out. Furthermore, AC-EWFC was tested for kinds of traditional as well as emerging contaminants such as dyes, pharmaceuticals, metal ions and it showed interesting results by an unconventional method. Moreover, the study was employed for real wastewater effluents samples from industries. Most importantly, AC-EWFC adsorbent showed good results for the kinds of pollutants, and support to carbon reutilization from EWFC is possible with nominal treatment and can be used for environmental remediation on a commercial scale.

1. Introduction

Recently, copious works have been done with the principal goal being the exploration of various adsorbent materials for the elimination of diverse contaminants from wastewater using different adsorbent materials (Ali, 2012; Ateia et al., 2020; Bulgariu et al., 2019; Singh et al., 2018). But, still, there is no certainty about them and their exact outcomes or

* Corresponding author at: Tarsadia Institute of Chemical Science, Uka Tarsadia University, Bardoli, 394350, Gujarat, India.
E-mail address: anilanachem@gmail.com (A.H. Gore).

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