

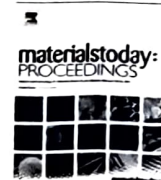
2022-23

Materials Today: Proceedings xxx (xxxx) xxx



Contents lists available at ScienceDirect

Materials Today: Proceedings

journal homepage: www.elsevier.com/locate/matpr

Synthesis of graphene oxide and its application for purification of river water

Sweta Gayen, Barnali Bej, Siddhartha Sankar Boxi*, Rounak Ghosh

Department of Chemical Engineering, Haldia Institute of Technology, Haldia 721657, West Bengal, India

ARTICLE INFO

Article history:
Available online xxxx

Keywords:
Graphene Oxide (GO)
River Water
Gravity Filter
Water Purification
Dissolve oxygen
TDS
TSS

ABSTRACT

Graphene oxide (GO) was synthesized through modified hammers' method. This GO was used for making filter bed. GO based gravity filter was utilized to purify river water. Different parameters of water, such as total dissolved solid (TDS), total suspended solid (TSS), pH, total hardness, dissolve oxygen (DO), iron (Fe) content, arsenic (As) content, and fluoride content were tested. Testing was done before and after filtration of river water. Comparison of each data was done between raw river water and filtered water. Significant quantity of TDS (53.3 %) and TSS (96 %) was removed through filtration. Iron removal efficiency was obtained 70.7 and 84.5 % by without GO and with GO based filter, respectively. Hardness was removed 61.34 % by without GO filter and 86.55 % by with GO filter. The obtained parametric data was also compared with permissible limit of each parameter according to World Health Organization (WHO).

Copyright © 2023 Elsevier Ltd. All rights reserved.

Selection and peer-review under responsibility of the scientific committee of the Advances in Chemical Engineering and Science.

1. Introduction

Water as a basic necessity, has a significant impact on our daily lives. It is the most valuable indispensable substances on the Earth, as all living organisms are dependent on water for their survival. Although 70 % of the Earth is covered by seawater, only a small percentage is used for drinking and other purposes. Surface water, including river water, lake water, and underground water are the main sources of drinking water, but because of pollution, urbanisation, rapid population expansion and rising demands, these resources are getting depleted rapidly [1]. Poor waste disposal, improper sewage treatment, and lacking management systems are the major reasons behind water pollution [2]. More than 90 % of municipal solid waste (MSW) in India is dumped for land filling without any safeguard. This stands as a critical threat to our environment. Untreated sewage water is a great source of water supply in the agricultural field, but the presence of excess amount of heavy metals in sewage water eventually toxifies the plants and human health too [3]. Hence, the lack of clean, pure water becomes a potential risk to public health.

Biological wastes, domestic garbage, inappropriately disposed of in open places, drains, and other water bodies causes serious health problems [4]. Filthy dumpsites are the primary source of groundwater pollution, as pollutants enter underground water through soil pores and render it unfit for human consumption [5]. The discharge of sewage water carrying all kinds of detrimental domestic wastes; agricultural run-off containing harmful pesticides, manures, etc.; and industrial effluents having contaminants, such as heavy metals, dissolved solids, organic matters, and disinfection by-products are the leading sources of water pollution [6]. The rapid increase of these pollutants has a significant impact on the quality of drinking water. Therefore, in order to reuse treated water for industrial, agricultural, and domestic purposes, treatment of groundwater and also improvements in purification or treatment technologies has become the major concern and most urgent for human health as well as other living beings and the environment.

A variety of techniques, such as adsorption, reverse osmosis, precipitation, and coagulation, have been developed for the purification of water. However, each of these approaches has some drawbacks. Among these, adsorption is the most simplest, effective and economical methods for water purification. Traditional wastewater treatment technologies have succeeded in treating effluents to some extent over the years. In the domain of chemical technology, the uses of membranes are increasing exponentially in

* Corresponding author.

E-mail address: ssboxich@gmail.com (S. Sankar Boxi).

<https://doi.org/10.1016/j.matpr.2022.08.131>

2214-7853/Copyright © 2023 Elsevier Ltd. All rights reserved.

Selection and peer-review under responsibility of the scientific committee of the Advances in Chemical Engineering and Science.