

Sustainable toxic dyes removal with advanced materials for clean water production: A comprehensive review

ABSTRACT

Textile dye is one of the significant pollutants of water worldwide. However, dumping the textile effluent to the environment is a common in most of the developing countries. Contaminated water in the textile industry may contain various toxic ingredients and people were easily infected with various diseases. The contamination may affect the marine environment and consequently extends around the world. The recycling of waste water is the significant option to reduce the environmental pollution. In particular, adsorption approach is one of the significant strategies to treat dye-contaminated water due to their advantageous of physico-chemical properties. In this review paper, variety of potential adsorbents for dye removal were critically reviewed, focusing on the efficient adsorbent to remediate dye-contaminated water. Specifically, the recent development of adsorbents containing carbon, metal supported adsorbents, surface functionalized gel adsorbents and photo-adsorbents were reviewed focusing on cutting-edge processes. Comparison of degradation efficiency for different adsorbents, synthesis approaches and their physico-chemical properties were assessed in systematic way. The perspective of the adsorbent materials associated with the dye degradation was discussed thoroughly. The evaluation of different advanced materials would contribute to the development of the sustainable dye removal process in near future.