

Step towards the sustainable toxic dyes and heavy metals removal and recycling from aqueous solution- A comprehensive review

ABSTRACT

The synthetic dyes and chemicals used in industries produce a tremendous amount of contaminated water. Most of the poisonous dyes generated from different textile industries are released directly to the environment. As a consequence, the discharge of wastewater from a large number of textile industries without prior treatment leads to significant negative impacts on human health. The utilization of efficient and inexpensive nano-adsorbent may reduce the adverse impacts of dyes in the environment due to their unique properties. To alleviate these issues, attention has been paid to develop efficient adsorbents for the removal of undesirable species from wastewater. Efficient and selective removal of dyes is gaining importance to reduce the environmental problems. Comparison of degradation efficiency for different catalysts could be a holistic approach that should be taken under consideration owing to search a suitable adsorbent. An in-depth evaluation of extensive variety of advanced adsorbents reported in literature for dye degradation has been furnished. In addition to underscoring the physico-chemical properties of different adsorbents, this review also endorses the mechanisms and efficiencies within the adsorption process. The challenges of dye degradation process are focused to reduce the adverse impacts of dyes in the environment. The critical assessment of next generation adsorbents would presumably be promoted the clean and affordable water purification process in practice.