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Novel Adsorbents for Waste Water Treatment

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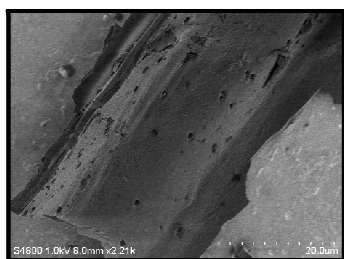
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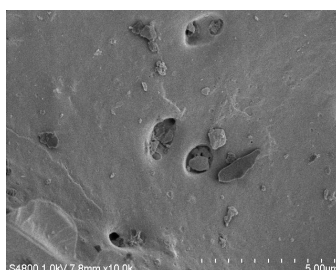
ABSTRACT

Large amount of waste water is generated by industrial, agricultural and domestic activities. Major content of waste waters is heavy metals and textile dyes which end up in natural bodies affecting living organisms. Hence, it is important to develop an effective method for removal of these pollutants from waste water. Various methods used for removal of metal ions and dyes include chemical precipitation, solvent extraction, ion exchange, oxidation/ reduction, membrane separation, adsorption etc. Among these methods, adsorption process is preferred due to its high efficiency, cost effectiveness and availability of various adsorbents. In our laboratory we have developed various cost effective novel adsorbents from sugar cane bagasse, hen feathers, and leaves of *Couroupita guianensis*, *Cestrum nocturnum*, *saraca indica*, *Barleria cristata* plants for removal of heavy metal ions (Cu, Ni, Cr) and textile dyes (methylene blue, indigo carmine, eosin Y, crystal violet, reactive red). For this purpose, batch adsorption process was used. Various parameters: pH, contact time, adsorbent dosage, particle size, adsorbent concentrations were optimized in order to achieve effective removal. In most of the cases removal was > 90 %. The adsorbents were characterized before and after adsorption using FTIR, FESEM, EDX, XRD techniques. The developed method was successfully applied to industrial effluents. The adsorbed metal ions/ dyes were recovered using various eluents such as HCl, HNO₃, KCl, NaOH. The study also covered kinetics and thermodynamics of adsorption process along with adsorption isotherms. Some of the results from our lab are summarized in this talk.

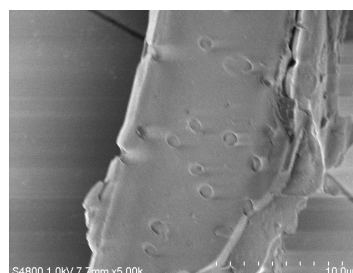
Graphical Abstract



Virgin ASB



Cr (III) loaded ASB



Cr (III) desorbed ASB

Keywords: Adsorbents, waste water treatment, adsorption isotherms, kinetics, thermodynamics