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An update on synthetic dyes adsorption onto clay based minerals: A state-of-art review

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Abstract

Dyes are growing to be a problematic class of pollutants to the environment. The disposal of dyes in water resources has bad aesthetic and health effects, hence the need to remove them from the environment. The need for treatment methods that are effective and low in price is rising hence a lot of research interest is being diverted towards adsorbents that are cheap, preferable naturally occurring materials like clays. In most reported dye adsorption studies, limited information on the relationship between characterization results with adsorbent performance on dye removal has been given. This review article seeks to report on the link between the adsorption characteristics of the clays and their adsorption capacities and to gather information on the modifications done on clays to improve their adsorption capacities. A critical analysis of the different mechanisms involved during the decolouration process and their application for dye removal has been discussed in detail in this up-to-date review. From a wide range of consulted literature review, it is evident that some clays have appreciable adsorption capacities on top of being widely available. It was also noted that several parameters like contact time, dosage, concentration, temperature and pH affect the removal of dyes. Furthermore, the application of clay minerals for decolourising water represents economic viable and locally available materials that can be used substantially for pollution control and management. Conclusions were also drawn and suggestions for future research perspectives are proposed.