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Adsorptive removal of humic acid from water by magnesium oxide

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Disinfection is a critical drinking water treatment procedure to guarantee water safety in urban water supply systems. However, an inevitable consequence is the generation of secondary pollutants, referred to as disinfection byproducts (DBPs). Toxicological researches have linked the ingestion of DBPs to harmful human health consequences like a higher risk of bladder cancer, reproductive problems, etc. Subsequently, the water authorities face immense challenges due to their existence in the drinking water. The foremost approach to limiting their generation in the drinking water is to eliminate their precursors prior-to disinfection. Humic acid (HA), a significant constituent of the natural organic matter in surface water, has been acknowledged as the primary precursor of DBPs. Thus, the present work aims to reduce humic acid content in water by magnesium oxide (MgO) adsorbent. To ascertain the mechanism of humic acid removal, characterizations of the adsorbents were conducted both before and after. At neutral pH level, the impacts of various process parameters are examined, including contact time, adsorbent dosage, initial humic acid concentration, and temperature. Moreover, studies were performed to assess the effects of different solution pH on the elimination of humic acid. The removal of humic acid was found to be increased at low pH. At pH 3, over 85% elimination was obtained. Furthermore, the role of several anions, including nitrate, sulfate, and chloride, in the adsorption of humic acid has also been evaluated. Overall, the present study would be conducive to proving the applicability of MgO for the reduction of HA and other organic matter from water and, hence, reduce the generation of DBPs.