INVESTIGATION OF MXENES ADSORBTION POTENTIAL FOR AZURE A AND METHYLENE BLUE DYES pH-RESPONSIVE BEHAVIOR AND ADSORPTION KINETICS

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Water pollution poses a significant threat to ecosystems, human health, and the overall well-being of our planet. The presence of contamination has reached alarming levels, demanding innovative, sustainable, and fast solutions [1]. This study aims to explore the potential of MXenes as a novel class of two-dimensional materials, effectively removing organic contaminants. MXenes exhibit high surface area, excellent conductivity, and strong adsorption capabilities. Synthesis consists of selective Al layer etching from MAX phase precursor, resulting in a layered structure that can be adapted for specific applications such as surface-enhanced Raman spectroscopy [2], biofuel cells [3], etc. The study includes experimental assessments of MXenes performance in removing organic pollutants such as Methylene Blue and Azure A from aqueous samples in a pH range from 4 to 6. Preliminary results demonstrate the promising potential of MXenes' effectiveness to adsorb and remove organic dyes due to the large active surface area. The adsorption efficiency and adsorption coefficients of MXenes were calculated for both dyes in all pH solutions. Moreover, reaction kinetics indicate superior fast adsorption performance. In conclusion, research signifies the importance of exploring innovative materials to combat water pollution, and MXenes may be the solution to it. The promising results suggest that MXenes could offer a sustainable and efficient adsorbent for the removal of organic pollutants.

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