National Institute of Technology Rourkela

Registration Seminar

Seminar Title	: Fly ash-based porous geopolymer- A prospective adsorbent for wastewater treatment
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Venue	: Seminar Room, Ceramic Department
Date and Time	: 02 Jan 2025 (10AM)
Abstract	: In recent decades, the treatment of industrial wastewater has become a significant global concern, and waste management needs the invention of new, inexpensive, environmentally friendly methods. Innovative wastewater purification technologies that use sustainable waste products are in great demand. The circular economy concept can be used in wastewater treatment techniques to use vast quantities of industrial waste. The most economical, reliable, and quick wastewater treatment technique is adsorption. A class F fly ash-based geopolymer (with added clay and slag) was prepared to remove MB dye from aqueous solutions. The geopolymerization process transformed the spherical fly ash particles into a porous, amorphous polymeric structure sodium-alumina-silicate hydrate gel (conformed from XRD, FESEM, FTIR). Although the removal efficiency decreased with increasing MB concentration (10-100 ppm), it rose with increasing geopolymer dosage (1-4g/L). In particular, the geopolymer (Batch-3,4, and 5) dosage of 4.0 g /L in 24 hours achieved an efficiency that exceeded 95%. However, at 5.0 g/L, further rises led to an approximate decrease in removal efficiency. A detailed investigation was carried out to optimize adsorption parameters, evaluate the removal efficiency among different fly ash-based adsorbents, synthesis methods, and their physico-chemical properties. A thorough discussion of the standpoint of adsorbent materials in relation to dye removal was held. Thus, the preparation of an adsorbent from waste materials and its successful utilization in dye extraction from wastewater will potentially provide a low-cost solution for wastewater treatment.