National Institute of Technology Rourkela

Progress Seminar

Seminar Title	: Fly ash-based porous geopolymer-A prospective adsorbent for wastewater treatment
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Venue	: Seminar Room, Ceramic Department
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Abstract	: In recent decades, industrial wastewater treatment 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 utilize vast quantities of industrial waste. In this case, fly ash and other precursors are used to prepare a porous ceramic adsorbent via the geopolymerization technique. First, powder adsorbent is prepared with a larger surface area and better adsorption capabilities, and the best powder batch is used to prepare the shaped adsorbent. All solid precursors are activated according to the batch composition to prepare the geopolymer slurry. To create a foamed slurry with a high surface tension, sodium dodecyl sulfate was added at 0.5%, 1%, and 1.5% as a foaming agent. Using the injection solidification process, the slurry was injected drop by drop into the PEG-6000 medium using a syringe. The foamed bead-shaped adsorbents are then repeatedly cleaned in hot water. The hardened beads were allowed to cure at room temperature for five days following two days of drying at 60°C. Standard techniques (FTIR, XRF, XRD, and SEM-EDX) were used to characterize the adsorbents. Methylene blue (MB), a hazardous dye, was removed from water using batch mode to assess the adsorbents' adsorption capabilities. With a maximum adsorption capacity of 37 mg/g and a removal efficiency of 90%, the ideal geopolymer-shaped adsorbent demonstrated a high adsorption efficiency for 10 mg/L of MB dye solution (above pH = 9) at room temperature. The adsorption kinetics, which follow a pseudo-second-order model, emphasize how the geopolymer's unique ion-exchange capabilities generally enabled it to absorb MB by chemisorption. Therefore, making shaped adsorbents from waste is cheaper, safer, more environmentally friendly, and simpler for treating wastewater than powdered adsorbents.