National Institute of Technology Rourkela

Departmental Seminar

Seminar Title	: Application of Activated Red Mud for Efficient Removal of Sulfate from Acid mine drainage
Speaker	: Satish Chandra Bhuyan
Supervisor	: Prof. Sahendra Ram
Venue	: Seminar Hall
Date and Time	: 08 Jan 2025 (4:00PM)
Abstract	: Acid mine drainage (AMD) is a major environmental issue associated with both active and abandoned mining activities. Acid mine water is usually generated from the microbial oxidation of pyrite-containing minerals in the presence of oxygen and water and contain a high concentration of sulfate and toxic metals. This mine effluent has the potensial to cause severe impacts on human health and ecosystems. The application of cost- effective and efficient treatment methods for the reduction of sulfate by ssilizing economical sorbents presents a significant challenge. The present research work almed to evaluate the efficacy of low-cost adsorbents like Red mud (RM), industrial by-product from the aluminum industry, to treat sulfate from the acidic mine effluent collected from a coal mine in Odisha. Chemical (IN HCI) and thermal activation (800°C) techniques were used to modify the adsorbents to improve their efficacy for the removal of sulfate from synthetic and collected AMD samples. A batch study has been conducted under different experimental conditions, including dotages of adsorbent, contact time, pll value, and initial concentration of sulfate. The raw and activated adsorbents were characterized using Fourier-transformed infrared spectroscopy, FESEM-EDX, and X-ray diffraction before and efler the batch adsorption study. The highest adsorption capacity (q) reported is 44 mg/g for the synthetic rulfate solution at 1 g/100 mL of HRM and the maximum sulfate removal percentage observed is 40.5% for the real AMD solution at 5 g/100 mL of HILM. The maximum pil value recorded was 6.9, observed in the synthetic sulfate zolution and 7.8 for the real AMD solution at 5 g/100 ml. of HRM. XRD analysis of activated RM reveals structural changes, such at the dissolution of some phases, the formation of new crystalline oxides. The results suggest the potential of HRM as an efficient and low-cost sorbent for sulfate removal from AMD, contributing to sustainable waste management and environmental remediation efforts