
Seminar Title	: Fluoride Decontamination from Ground Water using Jackfruit Peel Activated Carbon
Speaker	: Pratima Minz (Rollno : 519ch1006)
Supervisor	: Prof. Susmita Mishra
Venue	: New seminar Hall
Date and Time	: 12 Dec 2024 (11.00 am)
Abstract	<p>: Fluoride contamination is a globally acknowledged challenge, which is predominantly present in groundwater causing considerable health risk. In order to meet the global demand to produce new adsorbate this present study demonstrates the successful utilization of Jackfruit peel, as a precursor for the synthesis of activated carbon. The Response surface methodology (RSM) coupled with Box-Behnken design (BBD) was employed to optimize and study the interactions of various experimental conditions during the preparation of activated carbon (AC) using different activating agents (H₃PO₄, KOH, and ZnCl₂). The synthesis parameters involved in chemical activation included impregnation ratio, carbonization temperature and activation time. Results indicated maximum iodine value 1335.4 mg/g with yield 40% using phosphoric acid AC (AC/PA) at its optimum condition (carbonization temperature: 518°C, activation time: 88 min, IR: 28.8%). Influence of operating parameters such as pH, adsorbent dosage, contact period, initial concentration and temperature on fluoride removal was extensively studied in a batch mode to optimize process conditions. Fluoride removal was reported as 65% using AC/PA. So, a modified activated carbon using zirconium (AC/PA/Zr) was prepared and its fluoride removal efficiency was enhanced by 32% from aqueous solution. The experimental data from adsorption study was well fitted to Freundlich isotherm and pseudo-second order kinetic model with R² 0.99. The XPS analysis confirmed the presence of adsorbed fluoride ions by the peak at binding energy 685.5 eV on the surface of AC/PA/Zr and in FTIR spectra the shift of peaks around 600 cm⁻¹ depicts the bond formation of Zr-F. Further, sachet filters of AC/PA/Zr was prepared for providing a solution for immediate fluoride treatment that showed fluoride could be reduced to permissible limit using real water samples within 30 min. Fixed bed adsorption study was conducted in a fabricated lab scale column setup to study the effect of bed depth, flow rate, and initial concentration on breakthrough curve.</p> <p>Keywords: Jackfruit peel biomass BBD activated carbon Zr water treatment adsorption fluoride.</p>
