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ADSORPTION ISOTHERM STUDIES OF HEAVY METAL IONS ON RICE HUSK

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Heavy metals cause a severe problem to the ecosystem due to their highly toxic nature. Consequently, their removal from the environment, mainly from wastewater systems, is of essential to maintain the health of the environment. Use of naturally occurring, environmentally friendly substances has been attractive in this regard. Ability of rice husk, in its natural size, to remove heavy metal ions from simulated industrial effluents and is reported in this research. Different shaking and settling times at 150 rpm speed indicates that the optimum time period for the removal of all heavy metal ions investigated [Cd(II), Cr(III), Cu(II), Pb(II), Ni(II) and Zn(II)] is 10 minutes. Further, variation of solution pH and firing temperature of rice husk with the extent of heavy metal ion removal leads to the optimum firing temperature and the solution pH of 100 °C and 4.0-5.0, respectively. Adsorption isotherm experiments conducted with metal ion solutions of initial concentrations varying from 2-1000 ppm under optimized conditions demonstrate that all six heavy metal ions follow the Langmuir adsorption isotherm model with a high regression coefficient of about 0.99. According to linearized Langmuir isotherm plots, the highest adsorption capacity of 5000 mg g^{-1} is observed for Pb(II), and the capacity of other metals varies in the order of Pb > Cd > Cu > Ni > Zn > Cr.

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