

Abstract

The release of heavy metals in the environment that is coupled with industrial development and population growth, is one of the main problems in many countries. Chromium is one of the heavy metals, which at the industrial effluent from such as plating, weaving, leather tanning and curriery. Hexavalent chromium, is a powerful carcinogenic agent that modifies the DNA transcription process causing important chromosomic aberrations. The purpose of this research, is the use of tamarisk sawdust local adsorbent in two modes natural and modified for removal of hexavalent chromium from aqueous solution. First the tamarisk sawdust was prepared from a local shop in the city and the particle size in 1.18-2.36 mm was selected. For Sawdust Modification of nitric acid 0.1 M were used. In this research, removal of chromium in the batch condition was carried out in order to determine optimal pH, equilibrium time and isotherm models parameters. Also for removal of chromium in continuous condition a column of glass with a height of 30 cm and 3 cm in diameter was used as a fixed bed with gravitational water flow. Operation of the column was investigated under flow of 5, 6.5 and 8 ml/min, bed depth of 10, 12 and 14 cm and Cr(VI) concentration of 6, 8 and 10 mg/l. Finally, the absorber column behavior using BDST, was studied and model parameters were determined. The results research showed that maximum adsorption efficiency in both adsorbents at pH equal 1, respectively for natural and modified sawdust the 98.39% and 98.71% and the equilibrium time for the natural sawdust 180 minutes and for modified sawdust is 120 minutes. Isotherm studies showed that although both Langmuir and Freundlich isotherm model the data well described, but Freundlich model was better for describing adsorption isotherm. According to the results obtained for both the adsorbent, with increase in bed depth, gradient of breakthrough curves decreases. As a result mass transfer zone expands and far more increases time to reach the breakthrough time. Also with increase in flow rate and initial concentration, gradient of breakthrough curves is more and resulting in the breakthrough time is reduced. But in general, the curves slope breakthrough in modified sawdust less of curves slope breakthrough natural sawdust. On the other, times to reach the breakthrough point the modified sawdust is more of natural sawdust. The results research showed that the adsorption capacity increased with is increased bed height, so that with increasing column height of 10 to 14 cm, for natural sawdust from 50.43 to 118.85 and for modified sawdust from 56.29 to 132.56 mg/g increased. Also, with reduced flow and the initial concentration, the adsorption capacity is increased. Finally, evaluation of column parameters showed that BDST model has a good consistency with experimental data and on theoretical and experimental curves have similar trends.

Keywords: Removal chromium, Natural and modified sawdust, Fixed bed column, Adsorption isotherm, BDST model



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