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N. Gamze Turan and Yüksel Ardali
Ondokuz Mayıs University, Engineering Faculty, Dept. of. Environmental Engineering, 55139, Kurupelit, Samsun, TURKEY

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N. Gamze Turan, Yüksel Ardalı

Ondokuz Mayıs University, Engineering Faculty, Environmental Engineering Department, 55139, Kurupelit, Samsun, TURKEY.

Land filling is the most common method of disposal of solid waste all over the world. As well as municipal solid waste, industrial wastes, which may contain hazardous substances, are also received by landfills in many countries. Leachate is one of the problems arising from landfills. When water percolates through solid wastes, contaminants are leached into solution. The major concern with the movement of leachate into the subsurface aquifer is the fate of the constituents found in leachate. The fate of heavy metals is the greatest interest in leachate.

Several treatment technologies have been developed for eliminating heavy metals recently. Adsorption is one of the most interesting methods that it has been successfully applied for the heavy metal removal. Activated carbons were widely used as adsorbent materials because of their extended surface area, microporous structure, high adsorption capacity and high degree of surface reactivity. However, it is restricted due to its relatively high price, high operation costs, and problems with generation for the industrial scale applications. Recently, more research efforts have been focused on effective sorbents material in order to minimize the processing cost and solve their disposal problems in an environmentally sustainable way.

Adsorption of metal ions onto clay minerals has been studied extensively because both metal ions and clays are common components in nature. The cost of clays is relatively low as compared to other alternative adsorbents. Furthermore, the high specific surface area, chemical and mechanical stability, variety of structural and surface properties and higher values of cation exchange capacities make the clays an excellent group of adsorbents.

Sepiolite ($Si12O_30Mg8(OH)4(H_2O)4•8H_2O$) is a natural, fibrous clay mineral with fine microporous channels running parallel to the length of the fibers. The structure of sepiolite, in some aspects, is similar to those of other 2:1 trioctahedral silicates, such as talc, but it has discontinuities and inversion of the silica sheets, which give rise to structural tunnels and blocks. In the inner blocks, all corners of the silica tetrahedral are connected to adjacent blocks, but in the outer blocks, some of the corners are Si atoms bound to hydroxyls (Si–OH). This unique structure allows the penetration of organic and inorganic species into the structure and assigns sepiolite an industrial importance in adsorption.

The objective of the present study is to investigate the feasibility of using sepiolite for the adsorptive removal of Cu (II) from the industrial waste leachate. The adsorption capacities and sorption efficiencies are determined. The pseudo first order, the pseudo-second order, Elovich and the intra particle diffusion kinetic models are used to describe the kinetic data to estimate the rate constants.

The adsorption of Cu (II) from the aqueous leachate of industrial wastes onto sepiolite was performed using a batch equilibrium technique. At first stage, one-factor-at-a-time experiments were performed to see the individual effects of initial pH, adsorbent dosage and contact time. The adsorption of Cu (II) was favorably influenced by an increase in the adsorbent dosage. The maximum percent removal of Cu (II) were observed at pH>6, and significantly decreased at lower pH value. The optimum contact time is found as 10 min. for the removal of Cu (II). The increment in contact time from 10 min. to 120 min. did not show a significant effect

on efficiency. The maximum Cu (II) adsorption efficiencies were obtained at 94.45%. The pseudo second order kinetic model agrees very well with the dynamical behavior for the adsorption of Cu (II) from aqueous leachate of industrial waste onto sepiolite. The results indicate that the use of sepiolite that is locally available and almost free of cost as an adsorbent could be a viable alternative to activated carbon for the removal of Cu (II) ions from aqueous solutions.