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Removal of Phenol and Radiocesium from Aqueous Solution Using Clay and Organoclay

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Abstract: Kaolina clay and modified kaolina clay with hexadecyl trimethyl ammonium bromide (HDTMA) were used to remove phenol and ^{137}Cs from liquid waste. Experimental conditions such as pH and concentration of phenol and cesium in solution were carried out. Kaolina clay (C) and modified organoclay (MC) were characterized using surface area analyzer, infrared spectroscopy, X-ray diffraction and thermogravimetric analysis TGA. The analysis showed that (C) and (MC) have surface area about 290 and 180 m^2/g and crystalline structure responsible for the highest uptake of phenol and ^{137}Cs. Kaolina clay showed high thermal stablity up to 800 ^{o} C with total weight loss about 12% while (MC) showed thermal decomposition occurs in 3 steps. The TG steps are due to the arrangement of the (HDTMA) molecules a clay sheets. A pseudo-first-order and a pseudo-second-order rate equation were used to fit the adsorption experimental data. The suitability of Langmuir and Freundlich adsorption models to the equilibrium adsorption data for either toxic or radioactive material were investigated. The results obtained showed that kaolina clay and modified kaolina clay could be used successfully as an efficient sorbent material to remove phenol and radiocesium from aqueous waste solution.

Keywords*: Kaolina Clay; Phenol; radiocesium; Hexadecyl trimethyl ammonium bromide (HDTMA), Adsorption.*

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