

Kessara Jitniyom 2012: Adsorption of Lead, Copper, Zinc and Cadmium of Smectite in Upland Vertisols. Master of Science (Soil Science), Major Field: Soil Science, Department of Soil Science. Thesis Advisor: Associate Professor Anchalee Suddhiprakarn, Ph.D. 134 pages.

The study on adsorption of lead, copper, zinc and cadmium by smectite in upland Vertisols was conducted using clay fraction samples from topsoil and subsoil of Buri Rum (Br), Lop Buri (Lb), Chai Badan (Cd1, Cd2), Samo Thod (Sat1, Sat2) and Wang Chomphu (Wc1, Wc2) series, where smectite dominates their clay fraction. The batch experiment technique was employed emphasizing on the effects of pH and concentrations of heavy metals in the soil solution.

Results of the study revealed that the ability of smectite for adsorption tended to increase with increasing pH. The highest amount of lead, copper and zinc were selectively adsorbed in the pH range between 5-8 at 89.48, 84.94 and 85.91 percent respectively. Cadmium was best adsorbed in pH range between 6-8 at 49.77 percent. For study on the effect of lead, copper, zinc and cadmium concentrations on adsorption capacity, it was found that the adsorptive capacity increased with the increase of heavy metal concentrations up to 50 mg L<sup>-1</sup> where the constant rate for adsorption was observed. The highest content of lead, copper, zinc and cadmium adsorbed were 44.59, 42.43, 42.37 and 22.17 mg g<sup>-1</sup> respectively. Adsorption capacity for heavy metals depended on the amount of smectite in the clay. Clay samples with high smectite content (80-90%) had the highest capacity for adsorption whereas the ones with low smectite contents (20-40%) had the lowest adsorption capacity. Based on the highest adsorption values obtained, smectite could adsorb lead highest followed by zinc and copper. Cadmium was adsorbed lowest. The equation suitable for characterizing the adsorption was Langmuir equation.

Adsorption of heavy metals depends on the content of smectite in the clay fraction. The high solution pH can increase the adsorption capacity. Kind and concentration of heavy metals are limiting factors for ability to adsorb heavy metals of smectite. Therefore, the upland neutral-alkaline Vertisols dominated by stable smectite clay could effectively limit the distribution of heavy metals. This also depends on soil pH, kind and concentration of heavy metals. These parameters should thus provide the index for assessing toxicity of heavy metals in soil environmental setting.

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