Variation in adsorption parameters with bulk soil properties

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The re-use of land contaminated by pollutants from manufacturing or other industrial processes is currently high on the political agenda. Consequently, there is a growing need for good quality assessment of the risk from historical/current pollution. In order to identify and estimate the factors that affect adsorption variability, a range of periurban bulk soil samples from three different sites in the U.K. have been used to study the sorption of phenol, p-cresol, benzene, toluene and p-xylene. The soil samples were characterised by pH, loss on ignition, total organic carbon content, particle size distribution, surface area and iron content. Humic and fulvic acid along with humin were extracted from soil samples using standard techniques and analysed by ^{13}C NMR. Standard batch procedures were used to evaluate the sorption parameters in a concentration range between 1 and 500 mgL^{-1}. Acid-base titration of the bulk soil surface was performed in order to identify possible binding sites. Results obtained from the NMR studies showed a broad range of characteristics and presence of functional groups in the different soil samples studied, although no direct correlation between NMR studies and Kd values has been found. The sorption isotherms obtained for the different soil samples analysed showed that the pollutant is being adsorbed to the soil by different mechanisms, possible mainly due to the sample composition. This work has demonstrated that although soil organic matter is an important factor on adsorption processes, the composition of organic matter is not the key control of the sorption variability in bulk soil samples.

Intercalation of dye anion in Mg/Al-LDH (hydrotalcite): A novel *in-situ* method for wastewater treatment

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Wastewater from dyes production and printing and dyeing is one of key pollution sources in water environment. Chen et al. [1] had developed a novel method to remove chromate from Cr(VI)-bearing wastewater by in-situ synthesis of LDH (hydrotalcite) through Mg-Al hydrolysis and co-precipitation of chromate and LDH. The objective of this work was to investigate the efficiency and factors impacting removal acid scarlet GR from wastewater by Mg-Al hydrolysis and co-precipitation. Principle of the method may be described as follow: Mg^{2+} and Al^{3+} hydrolysis and forms Mg/Al-LDH by adding Mg^{2+}, Al^{3+} and NaOH into wastewater that contains the dye. The dye anions are selectively intercalated into interlayer positions of LDH to balance positive structural charges from Mg/Al octahedral sheets. The dye in wastewater is removed by settling of LDH synthesized in-situ, which are confirmed by analysing the settled LDH using X-ray diffraction, transmission electron microscopy and FT-IR, and chemical analysis of the aqueous solutions. The results indicate that factors affecting efficiency of dye removal include Mg/Al ratio and solution pH. The great removal efficiency of dye can be reached when pH values are between 8.5~10 and Mg/Al ratios are at 2:1~4:1. For a concentration of the acid scarlet GR of 360mg/l, removal efficiency of the dye is better than 99%.

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Reference

[1] Chen TH, Feng YL, Xu HF. Treatment of wastewater containing Cr(□) by LDH synthesizing in-situ. Environmental Science, 2004, 25(2): 94-98.