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EFFECT OF TEMPERATURE ON BUFFERING CAPACITY OF CARBONATED AND DECARBONATED KAOLINITE IN COPPER CONTAMINATED SOIL

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Abstract

Even though carbonate fraction of soils significantly influences soil contaminant retention, there are few reports in the literature on the influence of temperature on contaminant retention of carbonated soils. Therefore, this study was conducted to investigate the effect of temperature on buffering capacity in carbonated and decarbonated kaolinite and on changes in intensity of x-ray diffraction for major peak of kaolinite. To achieve this aim, samples of kaolinite containing 2.5% carbonate and also the decarbonated samples were assessed using various tests such as X-ray diffraction, titration analysis, buffering capacity, and pH in a temperature ranges of 25 to 1000°C. Results showed that, in order to use buffering capacity of carbonate phase through its interaction with contaminants, temperature should be kept below 500°C. At temperatures above than 500°C, decomposition of calcium carbonate was found to be associated with a pH increase, which is responsible for an increase in the soil buffering capacity. At a temperature ranges from 800 to 1000°C, major peak of kaolinite completely disappeared and its buffering capacity was close to that of the control sample.
Results indicate that, by adding copper nitrate, intensity of major peak of kaolinite for all the samples containing carbonate was larger than that of the decarbonated samples. At high concentrations of copper nitrate, pH levels of the kaolinite and decarbonated kaolinite samples became almost equal attributing to neutralization role of carbonate in soil buffering capacity at presence of copper ions.

Keywords: buffering capacity, carbonate, contaminant, kaolinite, temperature

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