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Sorption characteristicso(zinc and iron by natural zeolite and bentonite

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Abstract

Understanding the sorption process in natural zeolites is necessary for effective utilization of these minerals as nutrient adsorbents and consequently as controlled releases of plant nutrients. This research was undertaken to characterize the ability of five natural zeolites and bentonite minerals to adsorb and release zinc and iron. The potential for sorption of these ions were evaluated by applying the Langmuir and Freundlich equations. Zinc sorption data followed the Langmuir equation. The ability for Zn sorption were in the following order: chabazite> analcime > c1inoptilolite I > bentonite> c1inoptilolite2 > phillipsite. Diethylene triamine pentaacetic acid (DTP A) extractable Zn decreased with the increase in successive extractions. All sorbed zinc was extracted by DTP A in most zeolite species after four successive extractions while only 50% was readily extractable from chabazite. Iron sorption data followed the S-type isotherm and the results were described by a Freundlich adsorption model. The iron activity ratio (FeoxlFed) of sorbed Fe indicated the dominance of amorphous or poorly crystalline phases with zeolites and crystalline iron oxide phases with bentonite. The results suggest that natural zeolites, particularly chabazite and bentonite minerals, have a high potential for Zn and Fe sorption with a high capacity for slow release fertilizers.

Kenrords: Zeolite minerals: Bentonite; Zn and Fe sorption; Amorphous iron