Zeolitisation of Coal Fly Ashes Using Microwaves: Process Optimisation

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ABSTRACT

Soil remediation for heavy metals can be carried out using low-priced sorbents. Coal fly ashes treated with alkali can yield zeolitised materials useful for that task. In this paper we present the zeolitisation of different Spanish coal fly ashes using microwaves to drive the reaction. Different zeolite phases or phase mixtures can be obtained depending on reaction conditions. Ion-exchange tests showed that NaP1 and Herschellite were the better suited for remediation purposes and the optimization of the process to obtain monophase materials with high zeolite yields was carried out taking into account its possible industrial synthesis. NaP1 zeolite can be synthetised with high yield using moderate conditions and short times around 20 minutes. Herschellite is more elusive, requiring longer times around 1 hour and higher temperatures for moderate yields. The liquid to solid ratio is one of the main parameters affecting the synthesis of zeolites with microwaves, with low ratios yielding poor results due to lower microwave absorption by the reaction mixture.