



“Gheorghe Asachi” Technical University of Iasi, Romania



PREPARATION AND SEM-EDX-XRD CHARACTERIZATION OF MAGNETIC ZEOLITIC MATERIALS OBTAINED FROM COAL FLY ASH

Annie Shoumkova, Valeria Stoyanova*

Institute of Physical Chemistry, Bulgarian Academy of Sciences, 1113 Sofia, Acad. G. Bonchev Street, Block 11, Bulgaria

Abstract

A low-cost magnetic zeolitic material was synthesized from coal fly ash by means of a new, simple method involving alkaline hydrothermal zeolitization of fly ash (FA) followed by low-intensity wet magnetic separation. Scanning electron microscopy with energy-dispersive X-ray analysis was applied to characterize the composition, microstructure, and morphology of the material. The mineral and synthetic zeolite phases were identified by powder X-ray diffraction. The obtained magnetic zeolitic material (about 53 wt% of the raw fly ash) consisted predominantly of fly ash particles with moderate to high Fe content (10 - 60 wt%), covered with 2-3 μm thick shell of zeolite A crystals with fine crystals of zeolite P on them. Small iron oxide particles captured in larger iron-lean (< 2 wt%) zeolitized FA particles were also present in the product. Occasionally, uncovered iron oxide particles were detected, as well. The obtained magnetic zeolitic material could be easily manipulated in water suspension by means of low-intensity magnetic field and has potential application as an adsorbent for the removal of water contaminants from large volume effluents.

Keywords: coal fly ash, hydrothermal activation, magnetic separation, magnetic zeolite, SEM-EDX-XRD

Received: October, 2013; Revised final: February, 2014; Accepted: February, 2014

* Author to whom all correspondence should be addressed: e-mail: valeria@ipc.bas.bg; Phone: +359 2 9792507; Fax: +359 9712688