POSSIBLE USING OF CLAY-BASED NANOMATERIALS IN ENVIRONMENTAL DEPOLLUTION

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The toxic heavy metals must be removed from wastewater effluent prior to discharge into the environment. The most studied methods of decontamination of wastewater with heavy metals are: the adsorption, ionic exchange and filtration on membranes.

Our experimental research has focused on the production of adsorbents based on ceramic nanomaterials that are sufficiently efficient for the depollution of industrial liquid effluents. These adsorbents were realized starting from Romanian natural calcium bentonite (Orasu Nou deposit, Satu Mare) subjected to chemical and thermal treatments in order to increase their retention properties by optimizing their specific surface areas, interlamellar distances and porosities.

The adsorption of lead ions from aqueous solution on Al-pillared clays was investigated in this paper. Adsorption studies of Pb(II) ions on Al^{3+} pillared clays were carried out using the discontinuous batch technique due to its simplicity and reliability.

The raw material and the obtained nanomaterial were characterized by X-ray diffraction (XRD), Brunauer-Emmet-Teller (BET) and Barrett-Joyner-Halenda (BJH) methods. By pillaring process, the specific surface areas of modified clays were three times higher than the specific surface area of the raw material. The pillaring results in the formation of slit-like pore aggregates of varying sizes. The structure of pillared nanomaterial has a higher number of mesopores in comparison with natural bentonite.

The adsorption of lead ions depends on its initial concentration, initial pH solution, contact duration between nanomaterial and aqueous lead solution, adsorbant/adsorbat ratio. The synthetized nanomaterial appears to be a promising adsorbent for the removal of lead ions from wastewater.

Keywords: adsorption, lead, montmorillonite, pillaring, porosity