REMOVAL OF PARACETAMOL AND ASPIRIN TRACES FROM WATER BY ADSORPTION ON SOME NATURAL AND SYNTHETIC CLAY MINERALS

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Abstract

The presence of pharmaceutical contaminants in surface waters and drinking water is a major concern worldwide, due to the fact that they can produce various physiological effects in humans and animals even at low concentrations. The widespread presence of pharmaceutical residues in environmental compartments challenged the scientific researchers to find effective solutions for the removal of these pollutants. Adsorption of contaminants on the surface of solids is one of the best alternatives for the removal of organic contaminants due to its low cost, simple design, and ease of use [1]. Clay mineral adsorbents are considered as readily available natural materials that can be used to remove pharmaceutical micropollutants from wastewaters [2]. In addition, clay minerals are chemically and physically stable, have low toxicity and can be easily regenerated [3].

The aim of this work was to study the efficiency of removing aspirin and paracetamol from water using some natural clay minerals (montmorillonite, sepiolite) and a synthetic layered double hydroxide (Mg_3Al-LDH) as adsorbents. The adsorption experiments were conducted using ultrasounds at 40 kHz and room temperature. Different contact times (5-30 min) between mineral clays and drug solutions were applied. The change in the concentration of drug solutions was followed spectrophotometrically at 293 nm for paracetamol and 314 nm for aspirin. The concentration of drug solutions was 0.5 g/L and that of the clay minerals was 2 g/L of drug solution.

The adsorption capacity of mineral clays toward aspirin decreased in the following order: LDH>sepiolite>montmorillonite, while the paracetamol was better removed from solution when sepiolite was used as adsorbent. Generally, adsorption equilibrium was reached after 5 minutes of ultrasonication.

References

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