

Adsorption of Dyes on New Synthesised Layered Double Hydroxide Materials

Background

Dyes are widely used in many industries. Large quantities of dye effluents are discharged from the dyeing process causing serious environmental problems resulting from the water pollution. The adsorption is one of the most used treatment method due to its low cost and high treatment efficiency. Among the adsorbent materials, layered double hydroxides (LDH), also known as anionic clays, are used to remove harmful pollutants like dyes from wastewater due to their properties: large surface area, ease of preparation, exchangeable interlayer anions, compositional flexibility and low cost. The synthesis of LDH with new divalent and trivalent metals, represents an open and current field of research.

Methods

Four metal cations are chosen for the preparation of our LDH compound with a given metal ions ratio. The LDH compounds were synthesized by co-precipitation method at a constant pH value, A part of LDH material is subjected to heat treatment in a furnace under 550C for 1h (LDHc). LDH and LDHc were used to remove Briebich-Scarlet dye from aqueous solution. The effect of different factors on removal process were studied: temperature, pH, salts addition, LDH mass and dyes concentration.

Results

The obtained results showed that the removal percentage of the dye on both adsorbents LDH and LAHc increases with adsorbent mass, dye concentration, salt addition and contact time increasing.

Discussion & Conclusion

The LDH and LDHc were found to be good adsorbents for anionic dyes. The calcination of LDH promotes strongly the capacity of adsorption due to a larger pore size. Removal capacity can be promoted also by salts addition and increasing the contact time.

Interdisciplinary Reflection

We believe that our low cost and easy to synthesis materials will benefit the industry of water treatment and, therefore, can be used as a mitigation to pollution problems.

