

## Toxic Dyes Removal in Aqueous Solution Using Calcined and Uncalcined Anionic Clay Zn/Al+Fe

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**Abstract :** Layered double hydroxide with Zn/(Al+Fe) molar ratio of 3:1 was synthesized by co-precipitation method and their calcined product was obtained by heating treatment of ZAF-HT at 500°C. The calcined and uncalcined materials were used to remove weak acid dyes: indigo carmine (IC) and green bezanyl-F2B (F2B) in aqueous solution. The synthesized materials were characterized by XRD, SEM, FTIR and TG/DTA analysis confirming the formation of pure layered structure of ZAF-HT, the destruction of the original structure after calcination and the intercalation of the dyes molecules. Moreover, the interlayer distance increases from 7.645 Å in ZAF-HT to 19.102 Å after the dyes sorption. The dose of the adsorbents was chosen 0.5 g/l while the initial concentrations were 250 and 750 mg/l for indigo carmine and green bezanyl-F2B respectively. The sorption experiments were carried out at ambient temperature and without adjusting the initial solution pH (pHi = 6.10 for IC and pHi = 5.01 for F2B). In addition, the maximum adsorption capacities obtained by ZAF-HT and CZAF for both dyes followed the order: CZAF-F2B (1501.4 mg.g-1) > CZAF-IC (617.3 mg.g-1) > ZAF-HT-IC (41.4 mg.g-1) > ZAF-HT-F2B (28.9 mg.g-1). The removal of indigo carmine and green bezanyl-F2B by ZAF-HT was due to the anion exchange and/or the adsorption on the surface. By using the calcined material (CZAF), the removal of the dyes was based on a particular property, called 'memory effect'. CZAF recover the pristine structure in the presence anionic molecules such as acid dyes where they occupy the interlayer space. The sorption process was spontaneous in nature and followed pseudo-second-order. The isotherms showed that the removal of IC and F2B by ZAF-HT and CZAF were consistent with Langmuir model.

**Keywords :** acid dyes, adsorption, calcination, layered double hydroxides

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