Abstract

The objective of this work is to study the removal of a triazoic anionic dye Acid Black 210 present in the tanning industry effluents by practical and not costly physico-chemical processes.

The treatment methods used in this study for the removal of Acid Black 210 in synthetic solutions are adsorption, ion exchange and advanced oxidation. The adsorbent used are bentonite and calcite. Amberlite IRA400 resin is used for ion exchange. The three materials are characterized by DRX, ATR-FTIR, ATG/ATD and BET analysis. The advanced oxidation processes tested are Fenton ($Fe(II)/H_2O_2$) and Fenton/ultrasound ($Fe(II)/H_2O_2$/ultrasound).

The obtained results, show that the Acid Black 210 removal by adsorption on calcite is more effective than that by bentonite. The dye removal by calcite is important at pH $\leq$6. However, in the case of bentonite, the removal is maximum at very acidic pH then decreases rapidly with the pH increase. The adsorption capacities of Acid Black 210 by calcite and bentonite are 210 mg/g and 71 mg/g respectively. Under ultrasonic irradiation, the Acid Black 210 removal by calcite and bentonite is improved.

The removal of Acid Black 210 by Amberlite IRA400 is fast and important in a wide pH range (pH$\leq$ 8). The temperature enhancement implies a slight increase in the dye removal. The maximum exchange capacity calculated by the Langmuir equation is 657 mg/g. The presence of competitive ions hes not a significant effect on the Acid Black removal 210 by Amberlite IRA400.

The Acid Black 210 removal by the Fenton process is optimal at pH: 4 wathever the used conditions. The combination Fenton process with ultrasound, implies an acceleration of the oxidation reaction and a decrease of the efficiency.

***Keywords**: Acid Black 210, calcite, bentonite, Amberlite IRA400, adsorption, ion exchange, advanced oxidation, Fenton, ultrasound, tanning water treatment.*