# Abstract

***T***he present work focuses on the development of new efficient and practical composite materials for the removal of pollutants from water.

The main objective is to prepare iron composites and their use in the removal of Cr(VI) ions. Three types of composites were prepared: Fe(III)-Amberlite IRN150, Fe(III)-kaolinite and zero valent iron-kaolinite. These materials were characterized by SEM-EDX, XRD, ATR-FTIR, BET and by TGA-DTA analysis.

Fe(III)-Amberlite IRN150 composites were prepared by ion exchange processus and by precipitation under magnetic stirring and under ultrasound. Fe(III)-kaolinite composites were prepared with different proportions of iron and kaolinite, under magnetic stirring and under ultrasound. Zero valent iron-kaolinite composites as well as zero valent iron were prepared under mechanical stirring and under ultrasound.

The characterization of the prepared composites shows the formation of hydrated iron oxide only in the case of Fe(III)-Amberlite IRN150 composites. In the case of Fe(III)-kaolinite and zero valent iron-kaolinite composites, the combination with iron is confirmed by EDX analysis.

The results, of Cr(VI) removal show that whatever the used composite, the highest Cr(VI) removal is observed at acidic pH. The use of ultrasound in the preparation of the composites or in Cr(VI) removal experiments, enhances the composites efficencies.

Fe(III)-Amberlite IRN150 composites prepared by precipitation are more efficient in removing Cr(VI) ions than those prepared by ion exchange processus. The removal of Cr(VI) ions by Fe(III)-kaolinite composites increases with the increase of iron percentage. Their removal capacities are greater than that of kaolinite and lower than that of hydrated iron oxide. In the case of zero iron nanoparticles alone and supported on kaolinite, the removal of Cr(VI) ions is maximum at acidic pH. Zero valent iron-kaolinite composites are less efficient than zero valent iron alone for removing Cr(VI) ions.

**Keywords:** *composites materials, Fe(III), iron oxide, Amberlite IRN150, kaolinite, zero valent iron, Cr(VI), water treatment.*