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Ferrosilicates with low iron content in oxidation processes

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Abstract

Ferrosilicates with a low (0.85-3.05% by weight) iron content were obtained by sol-gel synthesis via hydrolysis of tetraethoxysilane in an acidic medium in the presence of iron(III) nitrate and characterized. It has been established that all samples of silicates are X-ray amorphous, however the formation of a new highly dispersed phase in ferrosilicate with the maximum studied iron content was evidenced by transmission electron microscopy. This sample has a relatively smaller specific surface area and a positive electrokinetic potential at pH = 3. The efficiency of all samples is estimated in the oxidative degradation of 2-nitroaniline in presence of hydrogen peroxide. Adsorption of 2-nitroaniline on the surface of ferrosilicates was negligibly low. It was shown that in the presence of iron silicates, the substrate was degraded. The highest rate of destruction of 2-nitroaniline in the presence of hydrogen peroxide at pH = 3 was observed with the sample of iron silicate with an iron content of 3wt%. At the same time, the yield of iron in the solution was insignificant. Oxidation is supposed to occur with the participation of hydroxyl radicals, which are generated from hydrogen peroxide by ferric cations (Fenton-like process).

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