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## Catalytic Degradation of Metronidazole Using Bentonite/Fe<sub>3</sub>O<sub>4</sub>/Ag Nanocomposite and Sodium Borohydride

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### Abstract

Antibiotic pollution in water is becoming a greater risk for the environment and public health every day, especially because it causes the development of environmental antibiotic resistance. In addition to the removal of antibiotics from water, it is very important to make them chemically harmless. In this study, a nanocomposite was produced by doping Fe<sub>3</sub>O<sub>4</sub> nanoparticles using solvothermal method and silver nanoparticles using co-precipitation method on bentonite nanoclay surface. This nanocomposite was then used as a catalyst for the removal of metronidazole antibiotic from solution by catalytic degradation with NaBH<sub>4</sub> reagent. It was observed that metronidazole could be removed very efficiently by the catalytic degradation process applied. In addition, high performance liquid chromatography (HPLC) analyses proved that metronidazole was degraded into different products as a result of the degradation process. In the study, the effects of pH and nanocomposite dosage on the removal processes were investigated and the optimum removal parameters were reported. As a result, it was observed that the produced Bentonite-Fe<sub>3</sub>O<sub>4</sub>-Ag nanocomposite has a very high catalytic activity for the degradation of metronidazole.

**Keywords:** antibiotic, catalyst, NaBH<sub>4</sub>, nanoparticle, removal