SYNTHESIS, CHARACTERIZATION AND TESTING OF A NEW MATERIAL OBTAINED ON THE BASIS OF NATURAL CLAY INTERCALATED WITH SILVER IONS

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A facile, ecofriendly, and cost-effective method was developed to prepare a microporous material based on natural chemically modified bentonite with silver ions (BN-Ag^0). This material presents a good catalytic activity against Malachite Green (MG) dye and bacteriostatic activity against newly isolated bacterium from sewage sludge named hereafter "*ISO SS*" and *Escherichia coli* (*E. coli*). MG is usually used in agriculture and the fish industry as a strong anti-bacterial, anti-fungal, anti-parasitic and dye agent, but it is also used to give color to textiles, packaging, etc. BN-Ag^0 was characterized by the following methods: energy-dispersive X-ray spectroscopy (EDX), scanning electron microscopy (SEM), Brunauer-Emmett-Teller (BET), Fourier-transform infrared (FTIR) spectroscopy, temperature programmed desorption (TPD) and X-ray Diffraction (XRD). The newly bacterium *ISO SS* was isolated by the technique of isolating the pure culture of anaerobically stabilized sludge. A mandatory characterization of *ISO SS* isolated strains from anaerobic stabilized sludge was performed in the process of bacterial species identifying. The cationic clay-based nanomaterial showed appreciable antibacterial activity against *ISO SS*, a Gram-negative bacterium. It also showed good activity against E. coli bacteria. Involved as a catalyst in the catalytic ozonation of MG dye, BN-Ag^0 significantly improves the oxidation time of the dye, due to its good adsorption and catalytic properties. The catalytic and antibacterial activities of the natural bentonite (BN) and of BN-Ag^0 were examined using performant characterization techniques. The lifetime of BN-Ag^0 catalyst was also evaluated. The recycling analysis of the synthesized nanocomposite showed that the BN-Ag^0 is stable even after six recycling with a minor change in degradation. The studied nanomaterial (BN-Ag^0) presents interesting properties both for the oxidative degradation of MG-type dyes and for a wider use due to its antibacterial properties. Results obtained are expected to provide valuable findings for the preparation of a good microporous material with multiple functionalities.

Keywords: antibacterial activity, bacteria, clay, catalytic ozonation, dye, silver catalyst.