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An efficient technique for uptake of disperse blue dye from wastewater by nano-sized hydroxyapatite fabricated from eggshell

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With the growth of industrialization, the organic dyes become one of the most significant pollutant sources which discharged through the environment by textile industries. The presence of dyes even in very low content especially, in water resources causes an adverse effect on human and marine creature health. On the other hand, the generated eggshell represents a significant solid waste which is commonly disposed of in landfills without any treatment. The undesirable environmental problems have been made an attempt to produce beneficial materials like bioceramics. The eggshell powder, which is the source of calcium, can be employed for manufacturing nano-sized hydroxyapatite for wastewater treatment contaminated by dispersing blue dye discharged from textile plants. The presented investigation demonstrated the synthesis of nano-sized hydroxyapatite from the eggshell. The raw material was dissolved in nitric acid solution after pre-treatment by crushing and powdering processes. The powder was precipitated from the acidic solution in the ultrasound environments. The effect of surfactant composition was studied on powder formation in detail. Initially, the adsorption efficiency of powders was evaluated by removal of a disperse dye from wastewater. The adsorption isotherm follows the Langmuir model in which the maximum dye adsorption capacity was determined to be 9500mg.g⁻¹. The precipitation in the presence of SDS with sonication provides a potential for synthesis of nano-sized hydroxyapatite, <10nm, which is able to uptake the disperse dye efficiently.

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