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ENHANCED EXTRACTION AND PURIFICATION OF PLASMID DNA FROM ESCHERICHIA COLI BY APPLYING A HYBRID MAGNETIC NANOCOMPOSITE

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Plasmid DNA (pDNA), a special kind of nucleic acid usually found in bacteria, is a small molecule physically distinct from chromosomal DNA that can replicate independently. This genetic material has been used in a wide set of biotechnological methodologies, such as genetic engineering, production of recombinant drugs and gene therapy, among others. In all these applications, the extraction and purification of pDNA appears as a crucial step. In this work, we describe the synthesis of a polyaniline and maghemite (PANI/?-Fe2O3) magnetic nanocomposite (MNC) and its use in a new Escherichia coli (E. coli) pDNA extraction and purification protocol. We have used transmission electron microscopy (TEM), UV-Vis spectroscopy, infrared spectroscopy (FTIR), X-ray diffraction (XRD), dynamic light scattering (DLS) and magnetic measurements to characterize the MNC, which was synthetized through an emulsion polymerization method. The yield, purity and quality of the pDNA extracted by using our proposed MNC protocol were evaluated through UV-Vis, agarose gel electrophoreses and PCR techniques, respectively. After comparing our results to those obtained by use of a commercial kit (Promega Wizard Plus SV Minipreps), we suggest that the novel protocol here proposed appears as a competitive alternative methodology. Not only the purification step can be completed within only 10 min, but the high adsorption capacity of the MNC results in pDNA yields that are almost twice the best values obtained by using the commercial kit. Hence, this new MNC methodology can be of general interest and find widespread use in different types of biomedical applications.