Abstract

In this research, the effect of various organic oxidants and synthesis method on the size, stability and control morphology of iron oxide magnetic nanoparticles, chemical coprecipitation, microwave, and ultrasonic waves with the use of tri sodium citrate, alanine and peptide (oxytocin) were used. The nanoparticles synthesized to different methods, such as XRD, SEM, TEM, FT-IR, UV-Vis, were studied. With consideration of the analysis and comparison of methods, synthesis of iron oxide nanoparticles, (sample G) using raw materials iron(III) chloride hexahydrate and iron(II) gluconate hydrate and peptide (oxytocin), by microwave the title of the optimal method were selected. This method has the highest efficiency, the smallest particle size (2-5 nm) the nanoparticle has the highest stability with spherical morphology, the small size of nanoparticles makes it easy to pass through the cell wall. Also, the use of peptides makes these nanoparticles highly selective for attack cancer cells. In this research, a peptide, an essential amino acid, is needed to synthesize nanoparticles iron oxide were used. The peptide attachment to the nanoparticle makes the nanoparticle intelligent and selective the drug is in the body, in addition, by binding the peptide to the nanoparticle, the nanoparticle stability increases, which causes increasing the efficiency of the nanoparticle for use as drug, followed by the interaction of iron oxide nanoparticles the G sample was digested with DNA of the calf thymus gland (CT-DNA) using the UV-Vis spectroscopy technique in solution tris buffer containing sodium chloride (10 mM) and pH = 7 at 300 and 310 K were studied. The amount of $[L]_{1/2}$ which is a measure of the amount of drug required to interact with cancer cells in this study a small figure was found to indicating that if compound is used as an anti-cancer drug a little dose is needed. Therefore, it reduces the side effects of the drug effect, binding parameters such as g (number of binding sites), K (constant bonding of iron oxide nanoparticles to the DNA), n (Hill coefficient), v (ratio of bound nanoparticles to DNA constant) and thermodynamic parameters such as m (ability of nanoparticles to denature DNA), $\Delta G^{\circ}_{(H2O)}$ (stability of DNA in the absence of nanoparticles iron oxide), $\Delta H^{\circ}_{(H2O)}$ (Heat needed denature DNA in the absence of iron oxide nanoparticles) and $\Delta S^{\circ}_{(H2O)}$, (Denaturation enthropy of DNA in iron oxide nanoparticles) have been determine. Result favorable the anti-cancer properties of iron oxide nanoparticles. The cytotoxicity Studies nanoparticles iron oxide the method MTT of the (Human breast adenocarcinoma) (MCF-7), showed Ic₅₀ nanoparticles iron oxide of 30.7. Therefore, these nanoparticles can are capale of inhibiting the activity and growth and proliferation of cancerous cells at low concentrations.

Keywords: Iron oxid, Nanoparticle, Organic oxidants, Anticancer.



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Synthesis of magnetic nanoparticles of iron oxid in

the presence of organic oxidants and

their anticancer properties

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