CHAPTER 5

CONCLUSIONS

Due to, its peroxidase catalytic activity, mixed γ-Fe_2O_3 and Fe_3O_4 NPs were applied to enhance the colorimetric assay for the detection of some OPs. The catalytic performances of the mixed iron oxide NPs was studied via optimization of the detection conditions such as pH, concentration of mixed iron oxide NPs, concentration of TMB and ratios of mixed iron oxide NPs. The results indicated that the mixed iron oxide NPs in a ratio of 1:1 showed peroxidase-like activity similar to that of Fe_3O_4 nanoparticles and relatively provided a better results than using pure γ-Fe_2O_3 nanoparticles. The maximum catalytic activity of the mixed iron oxide NPs was 20 min incubation time, 0.3 mg/mL TMB, 250 μg/mL mixed iron oxides NPs, and pH 3.0 acetate buffer.

Moreover, the optimized condition was applied for the detection of acetylcholinesterase inhibitory activity of two OP standards, namely dimethoate and profenofos by the mixed iron oxides nanoparticle-enhanced colorimetric assay. The detection performance of our strategy was compared with a standard GC-MS. The results showed that the OP detection by modified method could be observed in the concentration ranges from 0.1-3.0 μM. The percentage recovery of spiked OP standards at the concentrations of 2.0 and 2.5 μM in orange peel were found to be 98 ± 3 and 103 ± 2 for dimethoate and 102 ± 2 and 102 ± 3 for profenofos, respectively. In addition, the OPs quantification by our proposed method showed good agreement with those of standard technique.

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